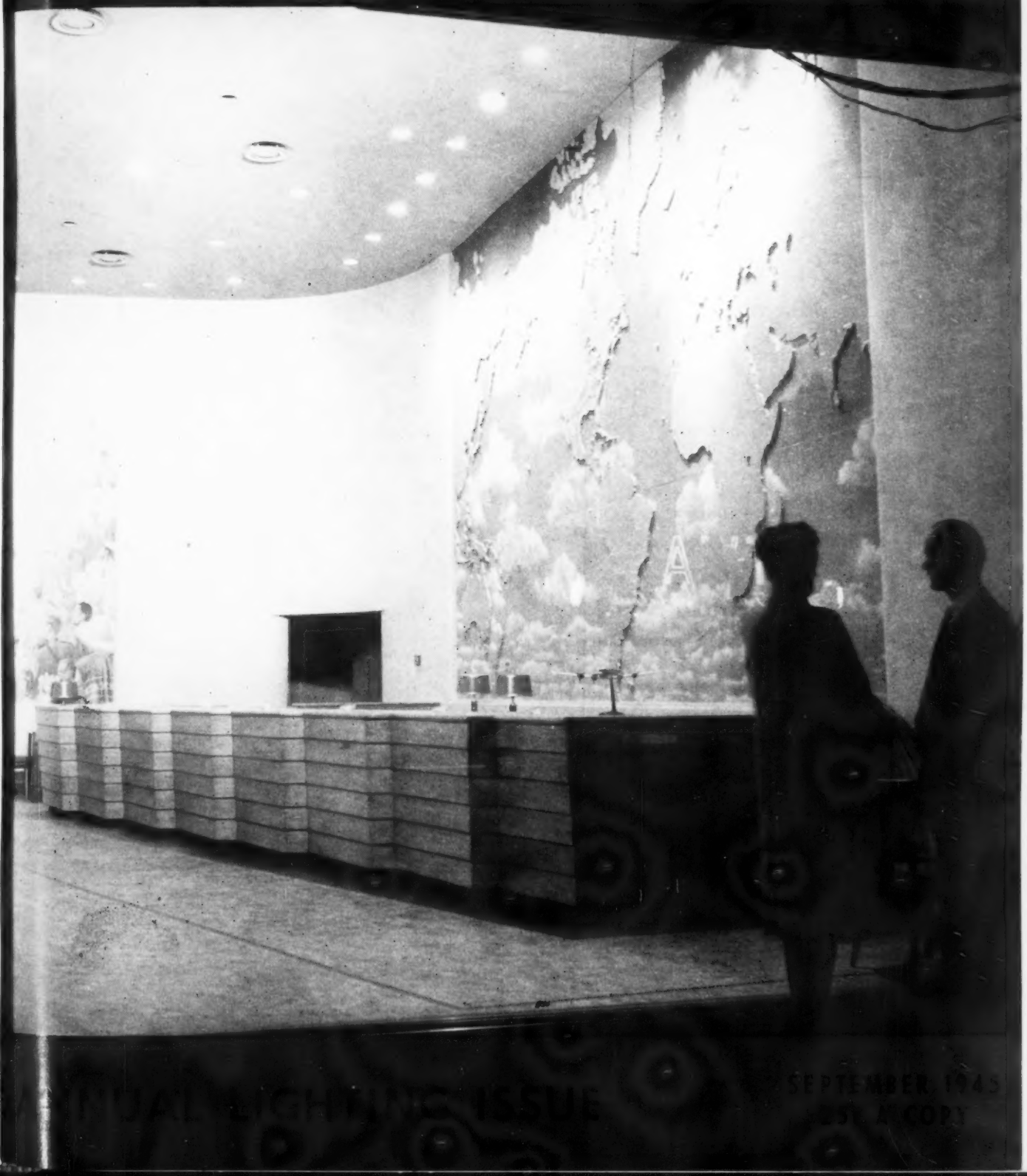
ELECTRICAL WEST



SAVE LIVES WITH *Light*

Above: Richard H. Smith, City Manager of Ventura, predicts: "That Ventura City will be ready with a street improvement program, including modernization of street lighting, as soon as material and manpower are available."

Below: BEFORE. Accidents like this occurred frequently at this sharp turn in the Coast Highway at Ventura.

AFTER. The accidents have dropped sharply since modern lighting was installed.

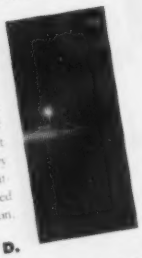
DO YOU WANT

Better Illumination

AT LOWER COST

FOR YOUR CITY'S STREETS?

Does your Community have a Street Lighting Modernization Program?



...ive cost traffic safety . . . improve business . . . beautify the city. These are some of the important benefits of modern street lighting, and the main reasons why many Southern and Central California communities are carrying out street lighting modernization programs. You may be surprised at how little it costs to modernize your city's street lighting. The services of an Edison Street Lighting Engineer are at your disposal for making an expert survey of your city's street lighting and submitting comparative costs of all recommended changes. There is no charge or obligation.

SOUTHERN CALIFORNIA EDISON COMPANY LTD.

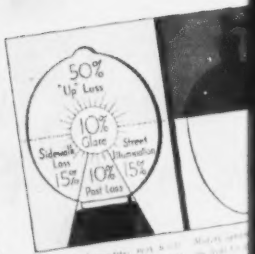
...o that adequate ...alled, helps to ...linquency . . . costs. Perhaps ...lans should in-

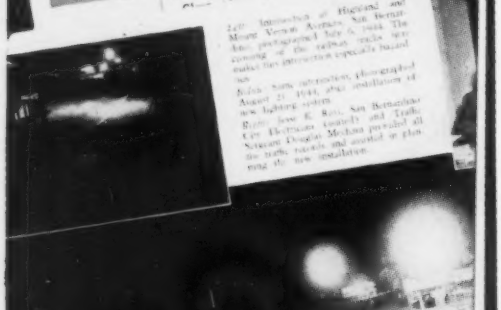
...Y LTD.

...o that in some communities equipment maintenance loses as much as 75% of every dollar spent for ...g! But not when the equipment is modern. ...ht luminaires, breakage of glassware averages ...per year, against only 1% with up-to-date ...and tools. And the old-style upright globes ...e much

...e the only reasons for the greater economy ...lighting equipment. As the diagram at right ...ws luminaires provide better illumination at ...ng cost.

...ervices of Southern and Central California ...termining their street lighting. Edison street lighting engineers are at the service of any city in Edison territory to help determine the facts about a street lighting ...gram, including estimated costs. There





SAVE LIVES WITH *Light*

Improved Intersect...

EDISON HELPS "SAVE LIVES WITH *Light*"

THESE ADVERTISEMENTS, typical of a series appearing regularly in *Western City* magazine, offer Edison-served communities the services of Edison lighting engineers to help solve street and highway lighting problems. Edison engineers have aided many communities to plan and put into effect street modernization programs.

Besides the obvious benefits of reducing accidents and discouraging crime, the company believes that proper street and highway lighting contributes materially to the general welfare and prosperity of any community.

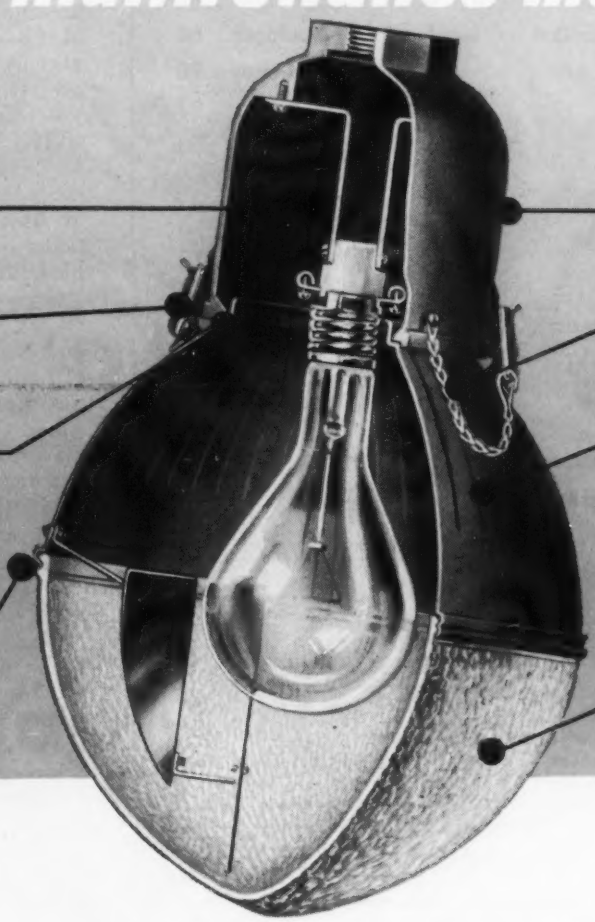
SOUTHERN CALIFORNIA Edison

ELECTRICAL WEST (with which is consolidated The Journal of Electricity), September, 1945. Vol. 95, No. 3. Published monthly by the McGraw-Hill Company of California, 68 Post Street, San Francisco, 4, Calif. Entered as second class matter at the post office at San Francisco under the Act of March 3, 1879. Additional entry as second class matter at the post office at Los Angeles. Printed in U. S. A. Subscription rates—U.S., U.S. Possessions and Latin American Republics: $2, 1 year; $3, 2 years; $4, 3 years. Canada: $2.50, 1 year; $4, 2 years; $5, 3 years. Other countries: $3, 1 year; $5, 2 years; $6, 3 years. Single copy, 25c.

Copyright, 1945. McGraw-Hill Company of California. All rights reserved.

NOVALUX

HOW FORM 79 LUMINAIRES reduce maintenance man-hours



Heavy-duty sockets and receptacles, firmly mounted, assure permanence of focus.

Toggle latches provide easy access to interior.

Machined joint excludes weather, dirt, and insects. No gasket to replace.

Permanently sealed assembly keeps interior clean, avoids chipping of globe edge, practically eliminates glassware breakage.

Aluminum—strong, durable, nonrusting. Needs no painting.

Suspension chain frees both hands during relamping, to prevent dropping reflector.

Flutes prevent heat concentration on lamp stem—prolong lamp life.

Holophane refractor or rippled globe—tough, long-life pressed glass. If breakage does occur, fully reconditioned reflector with new glassware is available through G.E.'s low-cost exchange plan.

Besides reducing your maintenance budget, Form 79 luminaires give you the advantages of low initial cost, unexcelled lighting efficiency and attractive, modern appearance.

Form 79 luminaires are again available in their prewar aluminum construction—with hoods, insulators, and reflectors for any style of mounting and any desired light distribution. G-E street-lighting specialists will help you apply them to best advantage or plan a comprehensive modernization program for the future. *General Electric Company, Schenectady 5, N. Y.*

Are you tieing-in with the NEMA Plan to give America better street lighting?

Buffalo plans to relight for safety

With the co-operation of G-E engineers, the city of Buffalo, N. Y., has completed a comprehensive analysis of its traffic-accident areas and has made postwar plans to modernize its street lighting. This improvement is expected to save 33 lives annually, and prevent more than 1000 injuries and nearly 5000 cases of property damage.

GOOD STREET LIGHTING BUILDS GOOD WILL

Buy all the BONDS you can—*and keep all you buy*

GENERAL ELECTRIC

452-29-3010

ELECTRICAL WEST

VOL. 95 SEPTEMBER, 1945 NO. 3

A New Focus for Lighting 75
Dimout and Death 76
Surveys Show Selling Strongly Needed 80
There's a Market for Many in Maintenance 82
Opportunity in Lamp Sales for Home Uses 83
Ultraviolet Protects School Children ..... Wedge Weber 84
Seabees Complete Power Plant on Guam ..... Lieut. W. A. Lawrence 86
Longview House Heating Data ..... Harry Kelsey 90
The Atom—New Source of Energy 97
- A Tide in the Affairs of Men 97
- How Atom Splitting Releases Energy 98
- Creating and Isolating the High-Power Atoms 100
- What to Expect from Atomic Energy 102

Nylon Hose or Atomic Bombs ..... Walter C. Heston 105
Truck Maintenance ..... H. M. Baker 107
Effect of Frequency Change Told Trade 109
Dealers—Roll Your Own Planning—VI 111
War Surplus Materials Available Now ..... John S. McCullough, Jr. 113

Departments

New Products 34
Bulletins 70
Electra 72
Lighting 75
Engineering 86
Sales 109
Editorials 114
Associations 116
News 122
Profiles 148

Cover photo—American Airlines new ticket office, Los Angeles, is 32 x 50 ft., with high ceiling, 20 ft.; achieves modern lighting effect with 36 down light flush mounted reflectors and 12 flush mounted reflector spotlights. Three lens type projectors are used to feature certain areas. Arthur A. Hutchason was architect and Newbery Electric Corp. electrical contractor.

CHANGE OF ADDRESS

Circulation Manager,
Electrical West,
68 Post St.,
San Francisco 4, Calif.

Please change my address

From .....

To .....

Signed .....

People

Harry G. Kelsey,
manager of the Cowlitz County PUD, who gives the industry the benefit of such load characteristic data as he has accumulated on electric house heating at Longview, has an electrical engineering background of 20 years in the utility business. Before going to Longview, he was sales manager of the Grays Harbor PUD. Prior to that for many years he was connected with the Grays Harbor Light & Power Co., at Aberdeen, Wash., a private utility taken over by the Grays Harbor Public Utility District.

A. O. Olson
and members of his staff at the Bureau of Light, Heat and Power, Public Utilities Commission, San Francisco, of which Olson is manager and chief engineer, contributed to the article, *Dimout and Death*, p. 76, of this number. From G. Case Geraty, Jr., electrical engineering inspector, came much of the text and research. B. W. Grethel and others translated the data into graphs and charts. But the real story of deaths due to poor visibility is written in blood and tears, not in the official records. These data, collected over a seven and a half year span by San Francisco, should become the tangible evidence so often needed to convince public officials and the public itself that much more needs to be done to save lives and property than talking about it. Providing seeing ability is one of the most effective things that *can* be done, in every city, everywhere.

Preview

Industrial Electrification
will be the theme of the October issue. It will contain articles giving the outlook industrially in the West and its reconversion status, a low-down appraisal of the West's steel industry, a long wanted feature on the Trentwood aluminum rolling mill near Spokane and stories on hydraulic log barking in the pulp and paper industry and sawmill electrical modernization. Also it will have electronic heating possibilities discussed and electric welding for mass production experience related. And of course the departments.

The greatest single selling force in America

IS READY TO WORK FOR YOU

Betty Crocker, as the personalized representative of the General Mills Home Service Staff, receives a million letters a year from homemakers . . . distributes more than a BILLION copies of her recipes to them . . . is backed by an 8½ million dollar annual advertising budget. She's the best known home service authority in the world . . . was named most helpful by women who gave her *more votes than any other ten candidates combined.* She is the most potent single selling force in America . . . a force that will not only actively support General Mills Home Appliances, but can broaden the entire appliance and housewares market and create constantly expanding profit opportunities for you.

Betty Crocker

Betty Crocker is a reg. trade mark of General Mills, Inc.

COUNT ON GREAT THINGS FROM GENERAL MILLS

General Mills won't make ordinary appliances. Each one is distinguished by exclusive, patented features that offer new usefulness and unmatched value to consumers. They'll be produced by a company with ample resources in money and experience to do a standout manufacturing-and-merchandising job . . . and to support dealers with alert advertising and selling strategy geared to profits!

General Mills makes news

GENERAL MILLS, INC., HOME APPLIANCE DEPARTMENT • MINNEAPOLIS 13, MINNESOTA

PRODUCT OF THE MONTH

PANTOGRAPH CONSTRUCTION

From top to bottom of A-C draw-out switchgear section: air circuit breaker in withdrawn, test, and operating positions. With pantograph construction, alignment is automatic; withdrawal is simple.

ALLIS CHALMERS

METAL-ENCLOSED LOW VOLTAGE SWITCHGEAR

MILWAUKEE, WIS. — Low voltage, metal-enclosed switchgear, featuring pantograph drawout construction, is described by Allis-Chalmers in its new Bulletin B6376.

The Allis-Chalmers pantograph (see photo inset) makes withdrawal of individual breaker elements both simple and quick. With pantograph construction, breaker alignment is automatic; no rail extensions are required; and only a crank is needed to withdraw the breaker!

In low voltage switchgear units, A-C now offers its G-25 circuit breaker — an efficient modern breaker for switching and protecting distribution circuits at 600 volts a-c and below, where 25,000 ampere interrupting capacity is sufficient. Shock and vibration normally encountered won't affect this breaker. It's built simply . . . requires few adjustments.

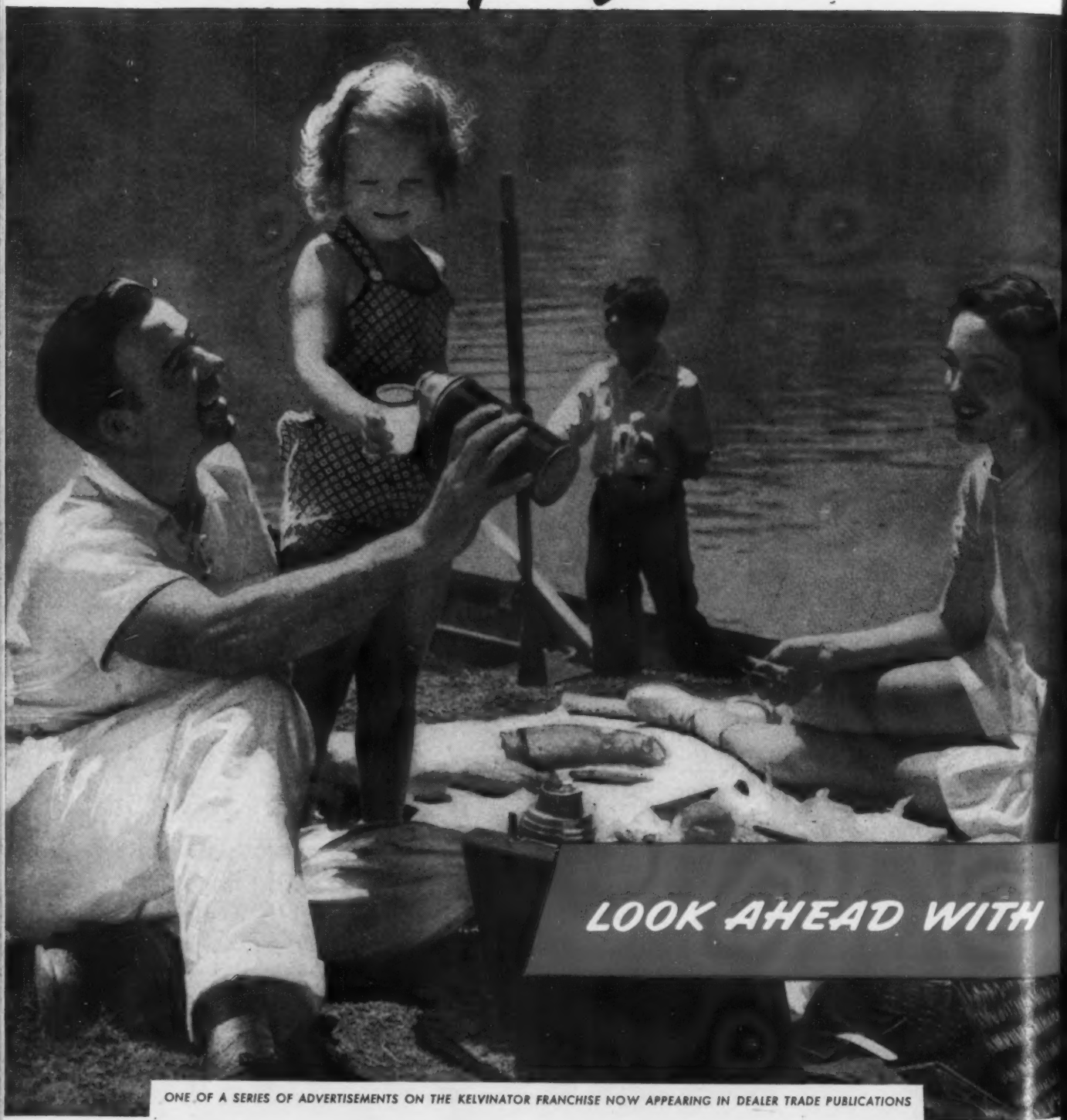
For outdoor application, Allis-Chalmers totally encloses the switchgear in a weatherproof housing, as shown on opposite page. Thus, rain, snow, and foreign materials are excluded from the switchgear . . . outdoor installation is made perfectly safe.

To get detailed information on Allis-Chalmers low voltage switchgear, contact your nearby A-C district office, or write for Bulletin B6376.

A 1899

MILWAUKEE, WIS.

Not just a Living— a Way of Life!



ONE OF A SERIES OF ADVERTISEMENTS ON THE KELVINATOR FRANCHISE NOW APPEARING IN DEALER TRADE PUBLICATIONS

really what every man wants . . .

just a living . . . but *a way of life* that
vides the opportunity for building a profitable,
py future.

opportunity to have those things every man
es for . . . security for his family . . . the
dship and respect of his community . . . a deep
onal faith in the future of his business.

Yes . . . add them all together and they total the things *you're* working for . . . things that come with sound, long-term personal planning.

And this is the reason the Kelvinator Franchise is so highly prized by the select group holding it. For Kelvinator believes in this kind of future for each of its Retailers . . . in a higher standard of business and human relations.

This thinking is the basis of Kelvinator's "Retail-Minded" policy that *no sale has been completed until the product leaves the Retailer's floor.* Kelvinator's entire sales program works to this end . . .

Selective Distribution Pattern—Kelvinator's retail organization is composed of not the most, but the finest Retailers . . . thus, with fewer Retailers, each with an adequate market, the result is more sales per dealer.

Less Inventory Investment—Kelvinator's line of products is so simplified and compact as to reduce Retailers' investments in inventory to the lowest. Each line is priced in accordance with Kelvinator's vigorous competitive policy . . . with salable values at each phase of Kelvinator's profit-building, step-up plan.

Point-of-Sale Power—Kelvinator's "Retail-Minded" merchandising means a complete program of advertising, sales promotion and sales training—sales building power aimed at one target . . . moving merchandise off the retailer's floor.

Yes . . . these are the reasons why Kelvinator means a personal business *future* for the Kelvinator Retailer . . .

Why the Kelvinator Franchise offers an opportunity to build the future every man wants!

The most Valuable Franchise in the Appliance Industry

RETAIL-MINDED

Kelvinator

DIVISION OF NASH-KELVINATOR CORPORATION

Kenosha • Milwaukee • DETROIT • Grand Rapids • Lansing

SUNDAY ON N-K RANCH!
Nash-Kelvinator's hit musical program Sundays 4:30 P.M., E.W.T. American Broadcasting Company.

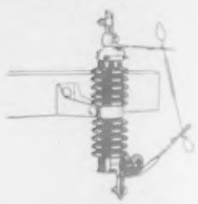
Better Construction Today—
Less Maintenance Tomorrow

KEARNEY PROTECTED THREAD CON-NEC-TAP CLAMPS

For better line connections that stay tight under severe vibration. Light, yet rugged in construction—resistant to corrosion.

KEARNEY TYPE T LIGHTNING ARRESTER

Assures continuity of service — low-cost lightning protection. Lightning charge is diverted to the ground quickly, line-to-ground current is limited to ½ cycle or less. Pole, cross-arm, or transformer mounting.



KEARNEY TRIP-O-LINK FUSE CUTOUT

A practical cutout that provides dependable protection at low cost. Tight, clean contacts and positive link separation are assured when a fault occurs.

KEARNEY PRODUCTS

MADE BY **JAMES R. KEARNEY CORPORATION** 4236 CLAYTON AVENUE SAINT LOUIS 10, MISSOURI

HERE'S PROOF

of Leader Superiority

One of the largest
OF RECENT TROFFER INSTALLATIONS . . .

Leader Engineers working with the plant executives and architects building a large new industrial plant were able to aid materially in creating and coordinating the beautiful installation pictured above.

A new plant which required large areas of ample but soft light was the problem. Ceilings were to be modern and low. To get soft illuminating effect, plus simple architectural beauty, Leader Recessed Troffer equipment was specified.

This installation, like all Leader installations, was handled through regular "straight-line" distributor channels. Leader engineers cooperated from its inception with the electrical contractor and distributor and are justly proud of the result.

Distributed only through the Better Electrical Wholesalers.

THERE IS A LEADER REPRESENTATIVE IN YOUR AREA

Carefully engineered for maximum versatility in installation and minimum maintenance and servicing cost.

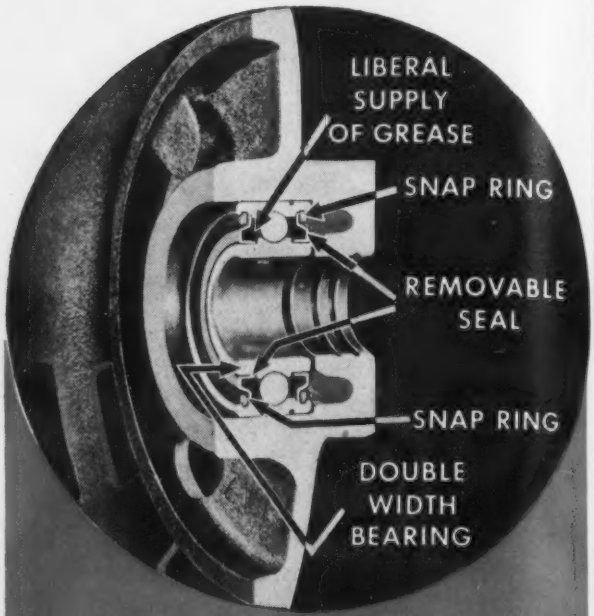
Post-War Lighting Now

LEADER ELECTRIC MFG. CORP.

6127 NORTH BROADWAY • CHICAGO 40, ILLINOIS

WEST COAST FACTORY • 2040 LIVINGSTON STREET, OAKLAND 6, CALIF.

ANOTHER WESTINGHOUSE MOTOR "FIRST" WHICH REDUCES INDUCTION MOTOR MAINTENANCE TO A NEW LOW... NOW STANDARD ON TYPE CSP MOTORS, 3 HP AND BELOW



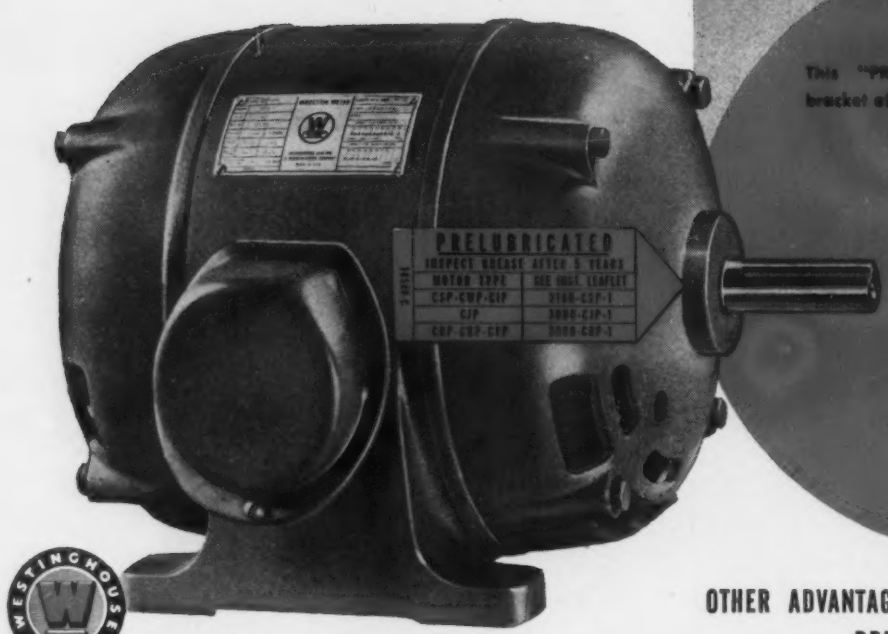
Install now... lubricate once between 1945 and 1955! Think of what this means in terms of man-hours saved—because you can forget lubrication of Type CSP Motors for *5 years* or more after they are installed.

Prelubricated ball bearings are not new in Westinghouse Motors. They have been proved in thousands of textile motor applications—which have run continuously for 7 years and been found in perfect condition after that time.

The CSP motor is another example of the extensive and continuous Westinghouse developments which have contributed to induction motor design. For full information, call your Westinghouse office—ask for DB-3100-CSP, or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa. J-21330

only ONE lubrication...

BETWEEN 1945 AND 1955!



This "PRELUBRICATED" Label (on end bracket of all CSP motors up to frame 225)

your assurance of:

- No overgreasing
- No unreplaced plugs
- No grease seepage into windings
- No "skipped" bearings
- No grease contamination
- Simplified lubrication schedules

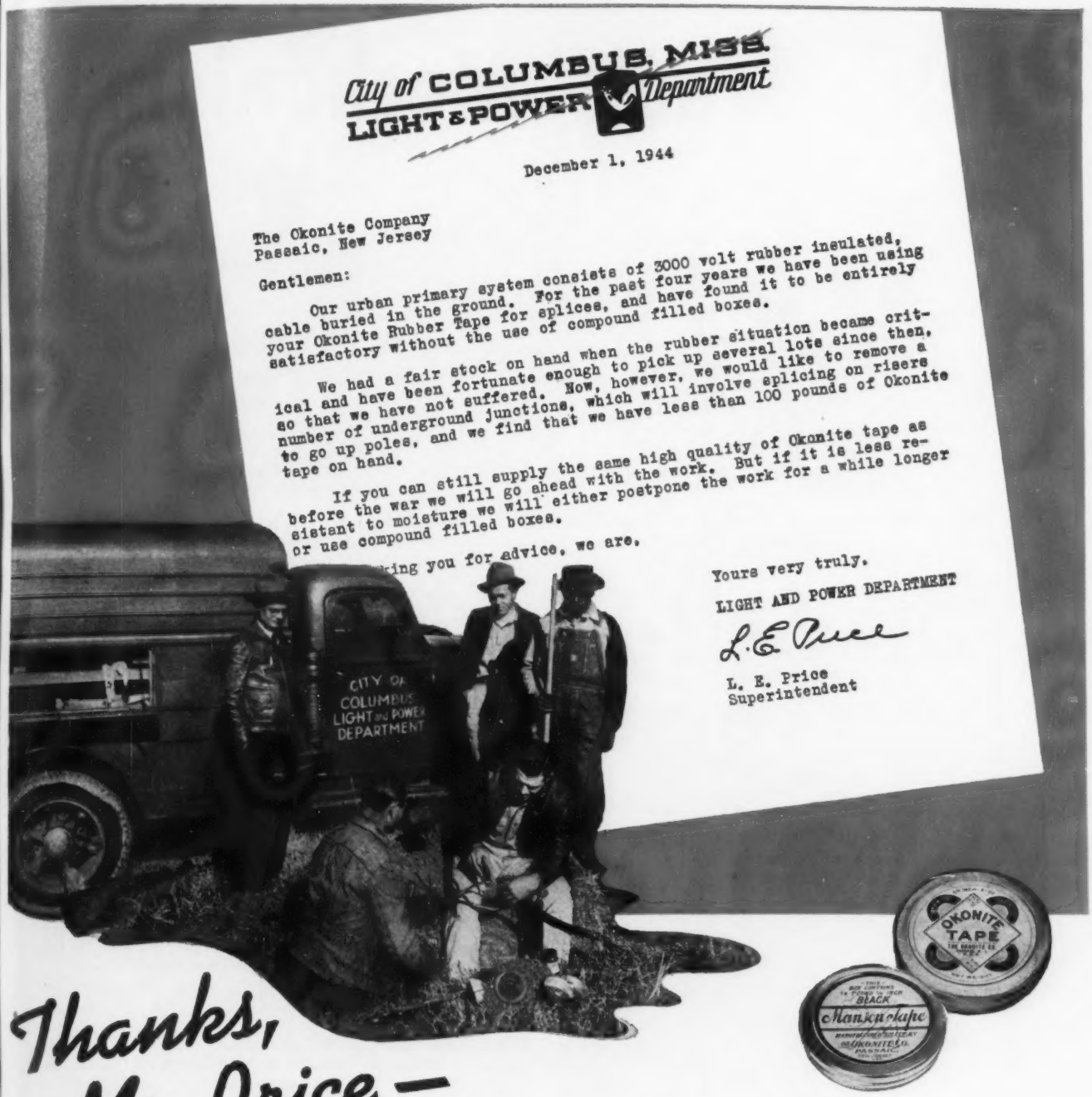
Westinghouse

PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE

TYPE CSP MOTORS

OTHER ADVANTAGES OF WESTINGHOUSE TYPE CSP PRELUBRICATED MOTORS

- Longer grease life
- TUFFERNELL Insulation
- *Die-cast Rotor* with oversize fan
- *Dynamically Balanced Rotor*
- *Liberal Through-Ventilation*—air enters front and leaves at drive end of motor


City of COLUMBUS, MISS.
LIGHT & POWER Department
December 1, 1944
The Okonite Company
Passaic, New Jersey
Gentlemen:
Our urban primary system consists of 3000 volt rubber insulated, cable buried in the ground. For the past four years we have been using your Okonite Rubber Tape for splices, and have found it to be entirely satisfactory without the use of compound filled boxes.
We had a fair stock on hand when the rubber situation became critical and have been fortunate enough to pick up several lots since then, so that we have not suffered. Now, however, we would like to remove a number of underground junctions, which will involve splicing on risers to go up poles, and we find that we have less than 100 pounds of Okonite tape on hand.
If you can still supply the same high quality of Okonite tape as before the war we will go ahead with the work. But if it is less resistant to moisture we will either postpone the work for a while longer or use compound filled boxes.
ing you for advice, we are,
Yours very truly,
LIGHT AND POWER DEPARTMENT
L. E. Price
Superintendent
CITY OF COLUMBUS LIGHT and POWER DEPARTMENT
OKONITE TAPE
Manson tape
BLACK

Thanks, Mr. Price—

We at Okonite like to get letters that tell us about good jobs done by our products. Naturally that goes for tapes as well as cables. And—also naturally—we like to get orders. Remain assured that in Okonite and Manson tapes we have consistently refused to use substitutes, and any such tapes you obtain are "the same high quality . . . as before the war."

But we haven't been able to fill all our orders for Okonite and Manson tape because of government restrictions on critical rubber. When Okonite and Manson tapes are again available to all, there will have been no let-down in what they have always offered utilities, railroads, and other industry. Long service life, for example, moisture resistance . . . better splicing . . . toughness and weathering qualities . . . in short, what it takes to give a joint the best insulation and mechanical protection that money can buy.

• When unable to obtain Okonite and Manson tapes, many of our customers are obtaining satisfactory results from our Dundee tapes or our Hazard Division's Panther and Dragon Tapes. The Okonite Company, Passaic, New Jersey.

OKONITE and MANSON TAPES

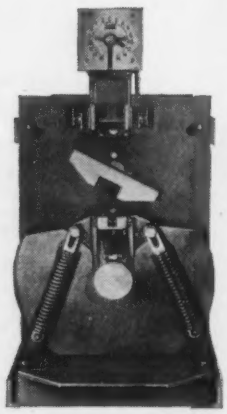
wherever electrical splices are needed

4131

"Quick-Break" Mechanism...

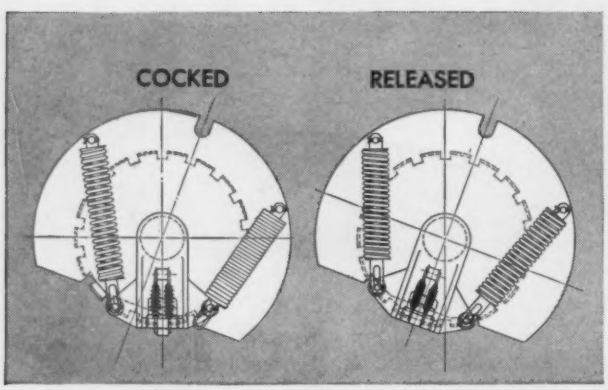
"QUICK-BREAK" principle means storing energy for sudden application . . . as an archer does when he pulls back on a bow.

◀ PRINCIPLE HERE IS SAME AS PRINCIPLE HERE ▶



ALLIS-CHALMERS tap-changing mechanism is of "Quick-Break" type — energy is stored in drive springs for a fast contact separation.

..With Self-Snubbing Action,



DRIVING SPRINGS in A-C "Quick-Break" mechanism are balanced . . . snubbing mechanism to smooth stop after a tap change.

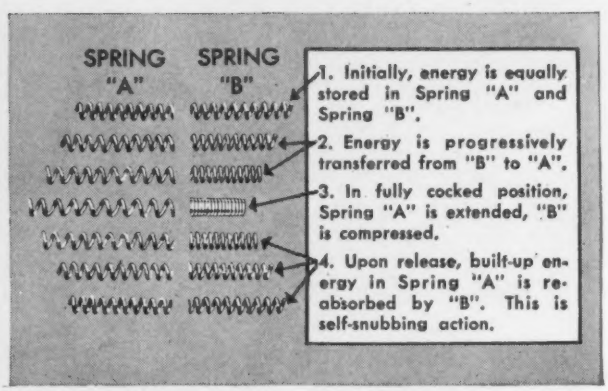

SPRING "A"
SPRING "B"
1. Initially, energy is equally stored in Spring "A" and Spring "B".
2. Energy is progressively transferred from "B" to "A".
3. In fully cocked position, Spring "A" is extended, "B" is compressed.
4. Upon release, built-up energy in Spring "A" is reabsorbed by "B". This is self-snubbing action.

DIAGRAM illustrates snubbing action obtained in balanced springs — such as are employed in the "Quick-Break" mechanism.

Saves Contacts, Reduces Wear!

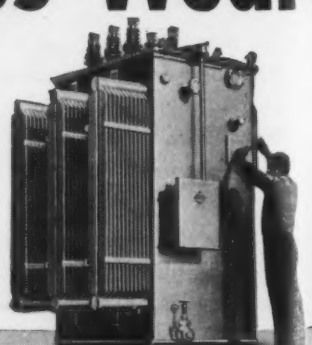
NO CONTACT has ever been replaced, because of deterioration, on an Allis-Chalmers 5/8% Step Regulator in normal service.

A big reason for this good record is the "Quick-Break" mechanism. Operating on the principle of stored energy, it separates contacts *fast* — no time for pitting and burning!

Balanced springs snub the A-C mechanism to a quick and shockless stop . . . reducing wear on mechanism parts. Thus lowest maintenance results!

Get the full story on economical 5/8% Step Regulators for all voltages by writing for Bulletins B6056A and B6065. ALLIS-CHALMERS MFG. CO., MILWAUKEE 1, WISCONSIN.

A 1827



ALLIS-CHALMERS 5/8% STEP REGULATORS

. . . AMERICA'S GIANT LUMBER INDUSTRY RELIES ON SQUARE D *for Balanced Electrical Control*

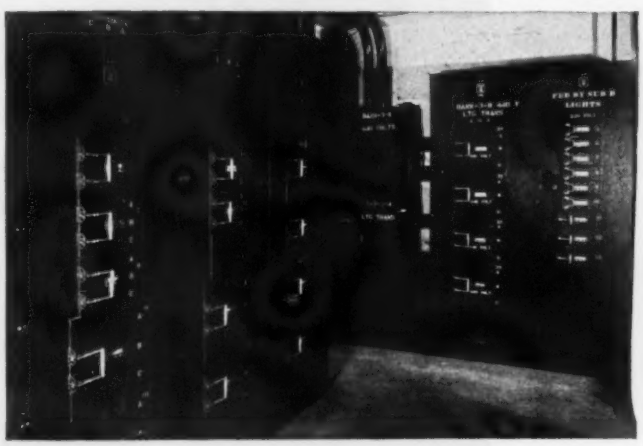
The post-war building program calls for an unprecedented amount of lumber to be used in reconstruction work throughout the world. Lumber mills must reconvert to meet peace time needs in a minimum of time and delay. That's why they are turning to the Square D Saflex Switch Board in order to be assured of *increased electrical efficiency.*

The installation of Square D Saflex Switch Boards not only give *balanced electrical control* from log to finished board but assures a *maximum delivery* of lumber footage without the usual expensive breakdowns from overload and out-moded equipment.

Maintenance engineers throughout the country especially approve of the Square D Saflex Switchboard because of its conversion adaptability to higher ratings as more units are needed. *It actually grows with your business!* Important, too, they know that it pays off in increased production at no increase in operational expense. And that's what counts!

Prepare now to meet your post-war problems by calling in a Square D Field Engineer. His knowledge of your immediate and long range electrical problems will save you time and money.

Peeler logs entering plywood mill for first stripping operation at the United States Plywood Corporation, Seattle, Washington.

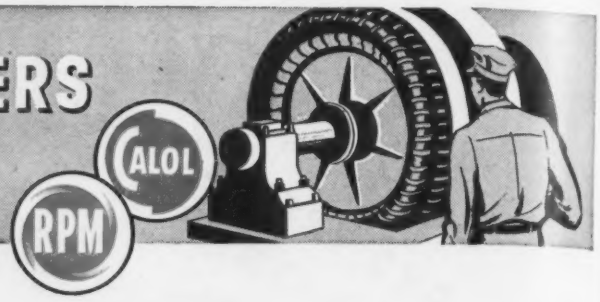


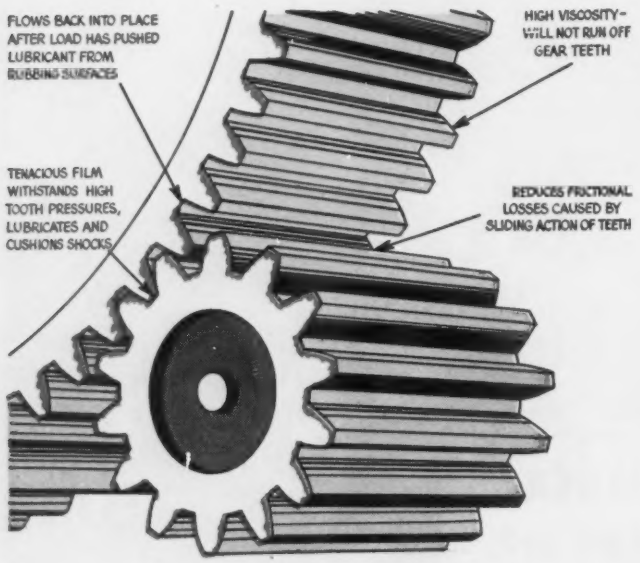
The Saflex Switch Board, pictured above, uses 50% less floor space than the conventional type switch and fuse boards.

SQUARE D COMPANY

LOS ANGELES 21 SAN FRANCISCO 3 • SEATTLE 1 • DENVER 4 • DETROIT 11 • MILWAUKEE 2

STANDARD ENGINEERS NOTEBOOK




FLOWS BACK INTO PLACE AFTER LOAD HAS PUSHED LUBRICANT FROM RUBBING SURFACES
HIGH VISCOSITY—WILL NOT RUN OFF GEAR TEETH
TENACIOUS FILM WITHSTANDS HIGH TOOTH PRESSURES, LUBRICATES AND CUSHIONS SHOCKS
REDUCES FRICTIONAL LOSSES CAUSED BY SLIDING ACTION OF TEETH

Adhesive greases cut gear wear

Constant protection against wear, frictional loss and metal fatigue on gears may be obtained by using Calol Pinion Greases. Recommended for open and encased spur, herringbone and worm-type gears, tenacious Calol Pinion Greases will not drip off. When pushed off in use, they flow sufficiently to recover gear teeth.

Calol Pinion Grease—0. For open or encased gears, but particularly adaptable for exposed high-speed gears in cold weather. May be used on wire rope.

Calol Pinion Grease—1. For medium-speed exposed gears. Much heavier and more adhesive than No. 0.

Calol Pinion Grease—2. For open spur gears in normal conditions. Requires heating for application.

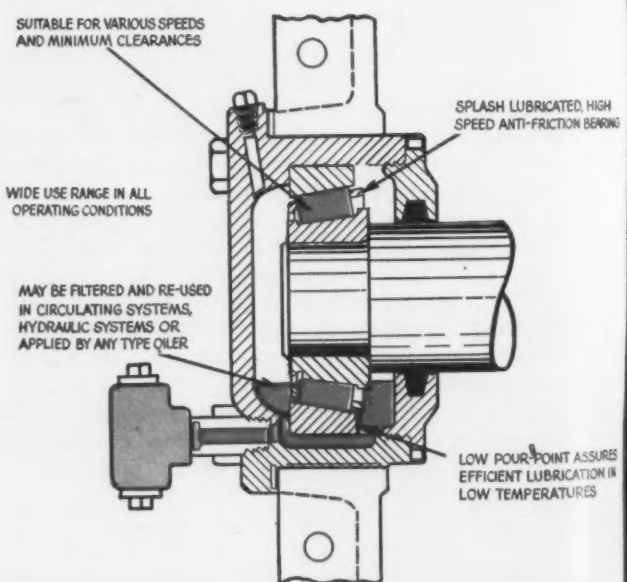
Calol Pinion Grease—5. For open spur gears in severe pressure and temperature conditions. Very heavy and adhesive.

Stable oil prevents clogging high-speed bearings

Many operators, desiring a single oil that will efficiently lubricate a wide range of small-clearance bearings of various types, have found Calol Engine Oil—8 ideal.

Especially recommended for the lubrication of bearings on generators, motors and other high grade machinery, Calol Engine Oil—8 will not gum and stop up passages. It may be applied by ring-, bottle-, drop- and wick-oilers and by hand oiling. It is also suitable for use in circulating systems, hydraulic systems and may be filtered and re-used.

A pale, solvent-refined mineral oil, Calol Engine Oil—8 is exceptionally stable and is always uniform. It has a low pour-point, assuring good distribution and complete lubrication of bearing surfaces in cold weather.


SUITABLE FOR VARIOUS SPEEDS AND MINIMUM CLEARANCES
SPLASH LUBRICATED, HIGH SPEED ANTI-FRICTION BEARING
WIDE USE RANGE IN ALL OPERATING CONDITIONS
MAY BE FILTERED AND RE-USED IN CIRCULATING SYSTEMS, HYDRAULIC SYSTEMS OR APPLIED BY ANY TYPE OILER
LOW POUR-POINT ASSURES EFFICIENT LUBRICATION IN LOW TEMPERATURES

Standard Fuel and Lubricant Engineers are always at your service. They'll gladly give you expert help — make your maintenance job easier. Call your Standard Representative or write Standard of California, 225 Bush St., San Francisco 20, California.

FOR EVERY JOB A **STANDARD OF CALIFORNIA** TEST-PROVED PRODUCT

G-E Q-FLOOR WIRING WITH ROBERTSON Q-FLOORS PROVIDES UTMOST ELECTRICAL ADEQUACY

G-E Q-Floor Wiring and Robertson Cellular Q-Floors together make unusual electrical adequacy possible. The cells of the Q-Floors on 6-in. centers are the raceways of G-E Q-Floor Wiring. Outlets are installed on the cells wherever they are wanted. The cells are fed by header ducts running at right angles to the direction of the cells. Each service has its own header duct. As many services as desired can be used, each with a different header duct.

Basically, G-E Q-Floor Wiring is a system of header ducts and various fittings for the purpose of drawing wires from a central point such as a cabinet or panel board to outlets in the entire floor area. It makes floor space extremely flexible. Factory machines, office desks, store displays can be moved around at will always with electrical outlets available.

FOR FURTHER INFORMATION on G-E Q-Floor Wiring, G-E building wire or wiring devices, see the nearest G-E Merchandise Distributor or write to Section CDW952-18, Appliance and Merchandise Department, General Electric Co., Bridgeport, Conn.

Here two G-E Q-Floor Wiring header ducts will carry different services feeding floor cells, 110-220 volt and telephone. Each service appears on 12-in. centers over entire floor area.

G-E Q-Floor Wiring outlets can be seen here in display room of department store with Q-Floors. Working models in stores are easily taken care of with floor outlets.

G-E BUILDING WIRE AND WIRING DEVICES

General Electric offers building wires and wiring devices for every purpose including Types T and TW small diameter Flamenol* Building Wire and hundreds of wiring devices—switches, lampholders, outlets, etc.

*Reg. U.S. Pat. Off.

THE HOME OF TOMORROW

A. Wilson Barstow, merchandising manager of the New England Power System, says "The home of tomorrow can be only as modern as its electric wiring system. Plenty of circuits and outlets should be installed so that fullest use can be made of new electric facilities."

ADEQUATE WIRING SERVES AND SAVES — THE KEY TO THE HOME OF TOMORROW

BUY WAR BONDS AND HOLD THEM

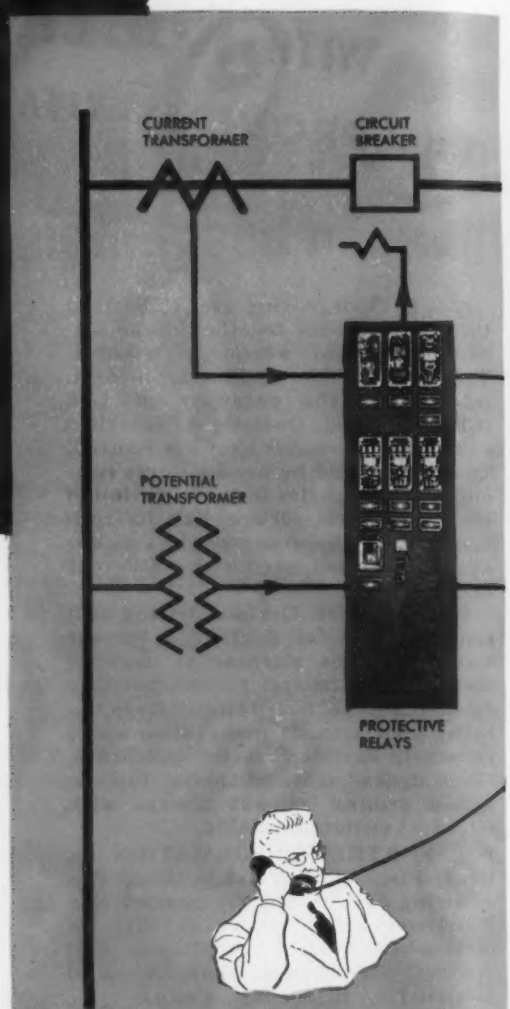
GENERAL ELECTRIC

Hear the General Electric radio programs: "The G-E All Girl Orchestra" Sunday 10 p.m. EWT, NBC. "The World Today" news, Mon. through Fri. 6:45 p.m. EWT, CBS. "The G-E House Party" Mon. through Fri. 4:00 p.m. EWT, CBS.

now you can

double

the channels for power-line carrier with this easy conversion



Here's a simple answer to rising demands for greater facilities in power-line carrier:

Double the channels by cutting channel width in half with Westinghouse single sideband carrier equipment.

It's no trick at all to convert existing Type JY equipment. It is so easily done the conversion can be made quickly in the field. It is so effective it will handle all carrier jobs . . . communication, telemetering, load control or any combination of these functions.

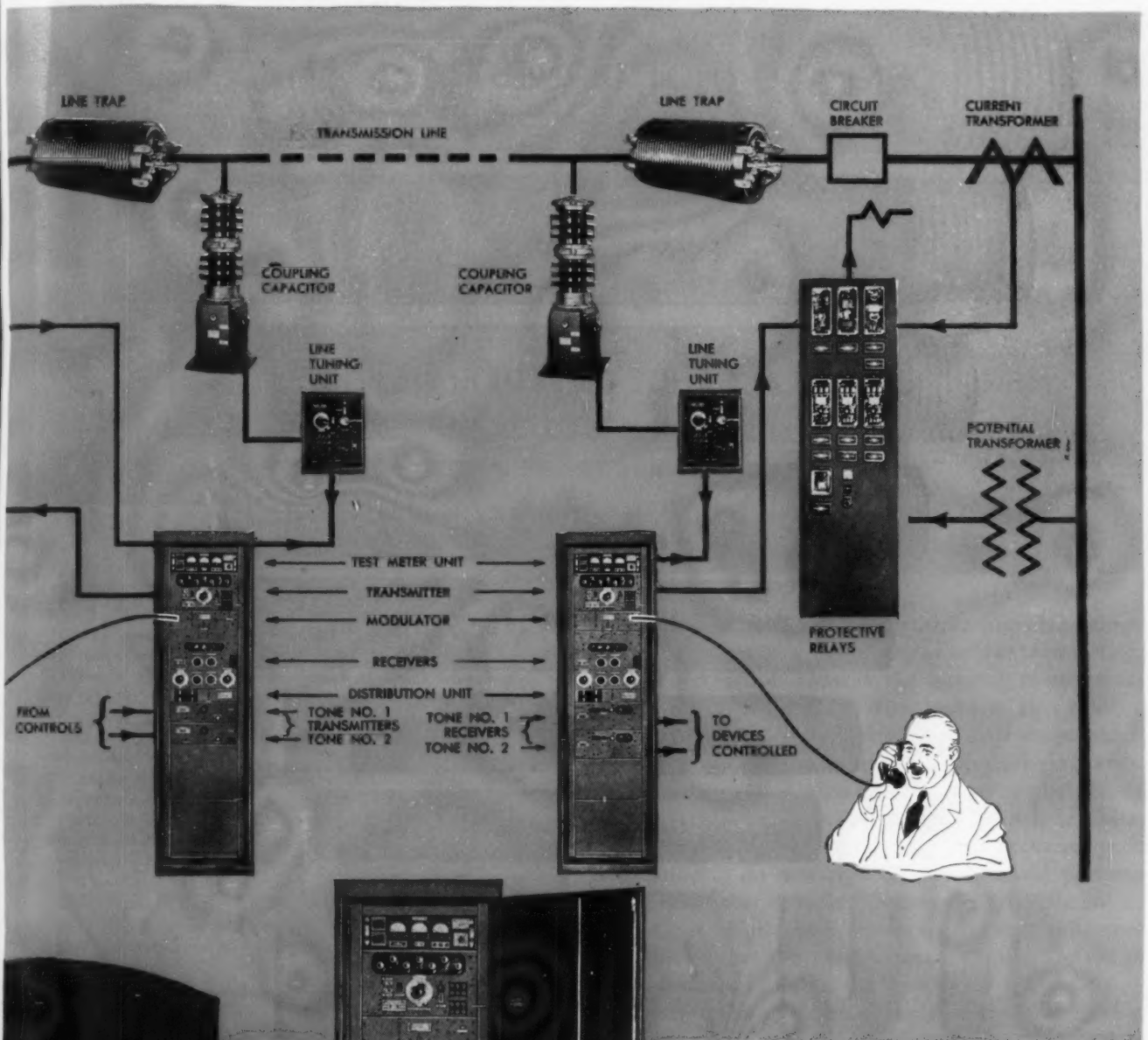
There are other important advantages in the single sideband system. The power of the transmitted and received signal is four times stronger than the normal Type JY power. Half the accepted noise power is eliminated. Corona modulation of the carrier is wiped out completely.

This modern, efficient solution to crowded carrier spectrums is another important contribution of Westinghouse to power-line engineering. Your nearest Westinghouse office can give you details on the conversion of standard Type JY equipment to single sideband. Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa. J-97092

Westinghouse

Electronics at Work

Single sideband system may be used for communication, telemetering, load control and any combination of these important carrier functions.



Existing Westinghouse Type JY amplitude-modulated equipment can be converted to single sideband transmission by adding a standard panel to transmitters and receivers.

QUALITY

CENTRAL RIGID STEEL CONDUIT

"There's Tested Strength in Every Length"

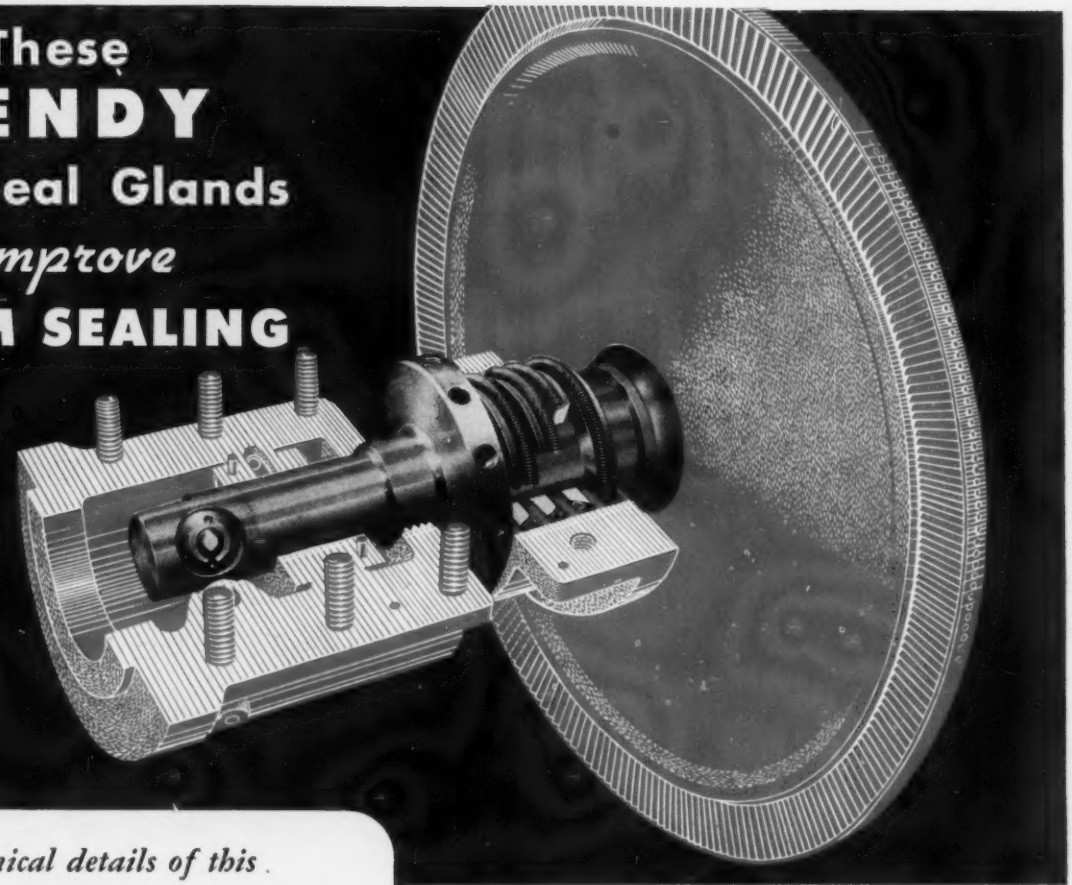
SPANG-CHALFANT

Division of The National Supply Company

General Sales Office: Grant Bldg., Pittsburgh 30, Pa.

District Offices and Sales Representatives in Principal Cities

These HENDY Dual-Seal Glands *Improve* STEAM SEALING



Technical details of this

HENDY TURBINE FEATURE

Carbon seals at each end of the rotor shaft are held in contact with the grooved walls by coiled garter springs. The outer surface of each of the carbon rings is tapered in such a way that the spring, in retaining the ring, also forces it against one sidewall of the groove. The ring is thus positioned and supported; it cannot "ride" the shaft.

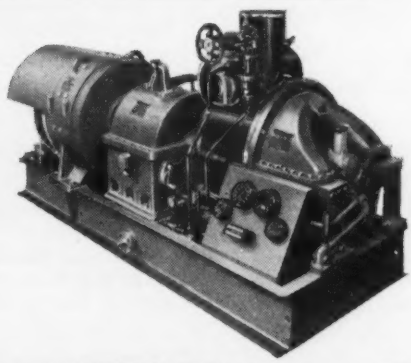
At the same time, the spring holds together the three segments of the carbon ring, maintaining a close clearance between shaft and ring. Sealing is thus accomplished at *both* the shaft and the sidewall, greatly increasing the sealing surface of each ring.

The housings for the carbon rings are split on the center line of the shaft, and may be removed without disturbing other parts of the turbine cylinder. This simplifies inspection or servicing of the glands.

Hendy turbine shafts are fitted with carbon gland rings that provide positive *side sealing* as well as *shaft sealing.* This construction reduces the number of rings required and prevents excessive leakage. In addition, this dual-sealing feature *minimizes shaft drag,* which can cause both shaft heating and excessive ring wear.

Refinement of design is characteristic of Hendy turbo-generators. Other advancements include a simplified governing system that results in accurate speed regulation . . . a new type of labyrinth seal between rotor disks that reduces interstage steam leakage . . . placement of oil filters, coolers, strainers, and other accessories that simplifies external piping. Details of these features are available upon your request.

Hendy turbo-generators are available for marine and industrial applications—direct drive or reduction gear, depending upon requirements—in sizes from 250 kw up. You are invited to submit your power-plant problems to Hendy engineers—phone or write your nearest Hendy office.



Shown at right is the model HG-26 Hendy 300-kw turbo-generator. Large numbers of this type are being supplied for service on Navy and Maritime Commission vessels.

JOSHUA HENDY IRON WORKS

ESTABLISHED 1856

SUNNYVALE, CALIFORNIA

Branch Offices: WASHINGTON · BUFFALO · CHICAGO · CINCINNATI · CLEVELAND · NEW YORK · LOS ANGELES · DETROIT · PHILADELPHIA · PITTSBURGH · SAN FRANCISCO · BOSTON

93-TG-9

TURBO-GENERATORS

REDUCTION GEARS

STEAM TURBINES

DIESEL ENGINES

Lower battery drain

2-WAY FM MOBILE RADIO

- **Lower Battery Drain**
- **Greater Communication Range**
- **Improved Tuning Reliability**
- **Complete Accessibility**

This 12-tube G-E FM mobile receiver draws less than 6 amperes from a 6-volt car battery.

● **General Electric 2-way FM mobile radio** gives top performance with less car battery drain than other comparable mobile equipment!

● **Designed with high-efficiency power supplies** and with specific consideration for the performance limitations of the car battery, G-E 2-way FM mobile radio will keep any battery on the job longer and reduce over-all maintenance expense.

Compare these ratings:

	UNIT BATT. DRAIN
G-E mobile receiver.....	**5.9** Amp
G-E 30-watt mobile transmitter:	
Standby.....	**2.3** Amp
On-the-air.....	**31.0** Amp
G-E 60-watt mobile transmitter	
Standby.....	**3.1** Amp
On-the-air.....	**46.5** Amp

For additional information on G-E FM mobile radio equipment, or for help concerning your particular communication problem, see your G-E representative, or write: *Electronics Department, General Electric, Schenectady 5, New York.*

Hear the G-E radio programs: *"The World Today" News, Monday through Friday, 6:45 p. m., EWT, CBS. "The G-E All-Girl Orchestra," Sunday 10 p. m. EWT, NBC. "The G-E House Party," Monday through Friday, 4 p. m., EWT, CBS.*

Everything for a 2-way radio

GENERAL ELECTRIC

163-D7-6818

Industrial Sales and Service are Easier with MITCHELL LIGHTING

HERE'S WHY!

1. MITCHELL fluorescent fixtures assure more abundant, more efficient light for industrial workers.

2. Greater mounting flexibility simplifies installation of single units or continuous rows.

3. Easier, lower-cost maintenance saves time and money.

4. Rugged construction assures longer, more dependable service.

5. Complete MITCHELL line provides a ready answer for every industrial lighting need. 2-40, 3-40 and 2-100 watt models, in open-end and closed-end types, including "Instant Start." RLM and FLEUR-O-LIER Certified.

Industrial users are quick to discover these benefits. As a result, you have the edge on competition . . . make sales easier . . . build volume business.

Alert Distributors and Contractors in every part of the nation are planning tomorrow's profits . . . *with MITCHELL.*

Makers of Industrial and Commercial Fluorescent Lighting Equipment
Store Window Lighting
Spotlights and Floodlights • Desk Lamps
Portable Floor and Table Lamps
Bed Lamps
Ultraviolet and Infrared Health Lamps
Residential Lighting Specialties

MITCHELL RLM

USE THESE SALES AIDS!

Write for full-size Catalog No. 281 and Pocket-size Catalog No. 290. Each tells full story of Industrial units . . . creates business for you.

MITCHELL
FIRST IN POPULARITY

Mitchell Manufacturing Company
2525 CLYBOURN AVENUE, CHICAGO 14, ILLINOIS
West Coast Factory and Sales Office: 1019 N. Madison Ave., Los Angeles 27, Cal.

Wagner OFFERS A DIVERSIFIED LINE OF DISTRIBUTION TRANSFORMERS

Type HEX pole-type transformer. Pocket-type stud bushings on the high-voltage side. Low-voltage stud-type bushings in tank wall. 15000 volts and below, 1½ to 100 kva.

Type HEBK pole-type transformer. High-voltage cover bushings, and tank-wall stud-type low-voltage bushings. Voltages of 5001 to 15000. 1½ to 100 kva.

Type HEB pole-type transformer. Tank wall, stud-type high- and low-voltage bushings. Standard voltages up to 5000, 1½ to 100 kva.

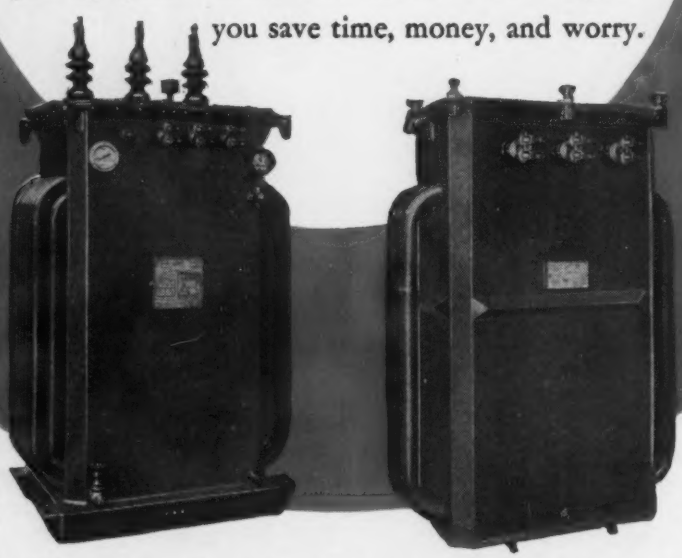
Save Time—
Save Money—Save Worry

Make Your Selection From Wagner's Wide Line of
DISTRIBUTION TRANSFORMERS

Wagner offers a diversified line of distribution transformers. Whatever your particular requirements may be, you'll find in the Wagner line the exact type of transformer to meet your needs. By placing your transformer orders with Wagner you save time, money, and worry.

Type HEBL transformer. High-and low-voltage cover-type bushings. Standard voltage combinations up to 69000 volts high-voltage. 150 to 500 kva.

Type HPBK three-phase distribution transformer. Cover-mounted high-voltage bushings and sidewall stud-type low-voltage bushings. 66000 volts and below. 10 to 200 kva.



Type HPB 3-phase transformer. Sidewall, stud-type high- and low-voltage bushings. Standard voltages up to 5000. 10 to 200 kva.

TRANSFORMERS
are but one of several
WAGNER PRODUCTS
serving industry.
Other WAGNER PRODUCTS:
AIR BRAKES
•
BRAKE LINING
•
HYDRAULIC BRAKES
•
INDUSTRIAL BRAKES
•
INDUSTRIAL BRAKE CONTROLS
•
NeRoL
•
TACHOGRAPH
(Recording Speedometer)
•
ELECTRIC MOTORS

Write for Complete Information: Your request for Bulletin TU-180 will bring you full information on our diversified distribution transformer lines.

T45-22

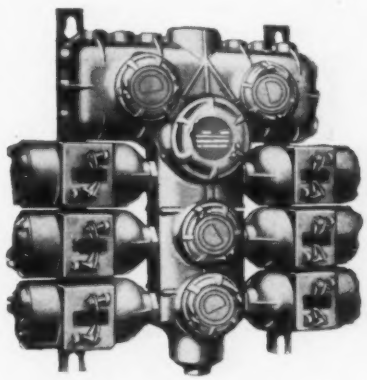
Wagner Electric Corporation
ESTABLISHED 1891
6381 Plymouth Avenue, St. Louis 14, Mo., U. S. A.
In Canada: Wagner Electric at Leaside, Ontario
ELECTRICAL AND AUTOMOTIVE PRODUCTS

CROUSE-HINDS

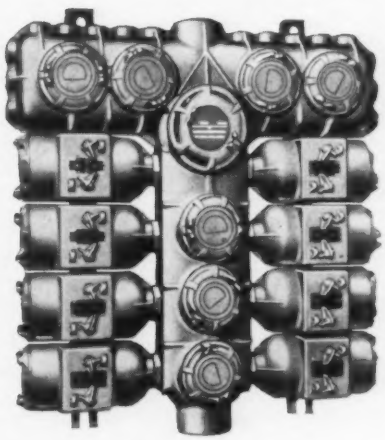
Improved
Type EDP Explosion-Proof Panelboards
Complete with Circuit Breakers

Explosion-Proof, Dust-Tight, Vaportight, and Weatherproof

For hazardous locations where ordinary electrical equipment is unsafe because of the presence of explosive atmosphere or dust. Also suitable where exposed to other dust, vapors or the weather.



Type EDP Panelboard-Size 1



Type EDP Panelboard-Size 2

Compact, simplified design. Threaded flame-tight covers and joints. Trip free circuit breakers with padlocking lugs on external handles.

Easily installed and inspected. Extra large cover opening for access to terminals. 3-inch through feed main hubs; 1 or 2-inch branch hubs.

Sealed. Each circuit breaker is sealed from the main wiring chamber. External seals are unnecessary in the conduits.

Solderless (pressure type) terminals for all field wiring.

Main terminals for 2 or 3-wire single-phase; 3 or 4-wire three-phase.

Branches furnished with 1, 2 or 3-pole breakers; with or without solid neutral. Circuit breakers 15 to 50 amperes.

Write for additional information to

You can buy them through a Crouse-Hinds wholesaler near you.

A Nationwide Distribution Through Electrical Wholesalers

CROUSE-HINDS COMPANY
SYRACUSE 1, N. Y., U.S.A.

Offices: Birmingham—Boston—Chicago—Cincinnati—Cleveland—Dallas—Denver—Detroit—Houston—Indianapolis—Kansas City Los Angeles—Milwaukee—Minneapolis—New York—Philadelphia—Pittsburgh—San Francisco—Seattle—St. Louis—Washington
Resident Product Engineers: Albany—Atlanta—Charlotte—New Orleans
CROUSE-HINDS COMPANY OF CANADA, LTD., Main Office and Plant: TORONTO, ONT.

CONDULETS · TRAFFIC SIGNALS · AIRPORT LIGHTING · FLOODLIGHTS

Maximum protection against OXIDATION and RUST is built into Shell Inhibited Turbo Oil

Shell engineers early recognized that the difference between good and poor turbine lubrication may hinge on the oil's ability to resist oxidation and emulsification, and to prevent rust.

That led to the painstaking, built-from-the-ground-up formula which has put Shell Inhibited Turbo Oil in a class by itself.

Crude stocks are carefully selected . . . specially refined by a solvent extraction process to increase *stability* and *demulsibility*. Then the oil is fortified with Shell-developed additives — one to build up its naturally high *oxidation resistance*, another to assure exceptional *rust-preventing* quality through metal-wetting ability and high film strength.

As it does with all Shell lubricants, Shellengineering pays off in top performance for users of Shell Inhibited Turbo Oil. Ask the Shell man to show you service records on this remarkable oil that has resisted oxidation and rust formation after years of service. In marine, industrial and public utility installations it has invariably surpassed the performance of replaced oils.

For better turbine lubrication, rely on Shell Inhibited Turbo Oil, built from the ground up exclusively for turbines by Shell Oil Company, *Incorporated.*

SHELL TURBO OIL
(INHIBITED)

Shellengineered for the job

Weatherproof LASTS!...and LASTS!!...and LASTS...!!!

FOR CONTINUITY OF SERVICE ...ANACONDA TRIPLE BRAID and DURALINE URC

Thorough research—strict manufacturing and testing procedure—these are reasons for the long life of Anaconda URC. No coming apart—no festooning. Be *sure* of maintenance-free service—*specify Anaconda URC Weatherproof.*

45928

LOOK TO Anaconda FOR WEATHERPROOF THAT LASTS!

READY NOW! G-E's Program for the

SEEING IS THE BIGGEST THING IN SELLING

Surveys that have been checked and rechecked prove that eight out of ten stores want new lighting. They want it fast . . . commercial lighting is your first, immediate opportunity for lighting profits. And a good lighting job can bring you not only initial profits but also a steady year-after-year lamp replacement business.

Ready for you now, to help you realize the fullest profits from lighting, is a complete General Electric program for the commercial lighting market—SEEING IS THE BIGGEST THING IN SELLING. Your G-E Lamp Representative will be glad to tell you all about it. Call him NOW—the sooner you see him the greater your competitive advantage will be.

Right now, G-E Lamp advertising in more than 40 trade publications, is telling prospective purchasers of lighting . . . everything from banks to beauty parlors . . . that SEEING IS THE BIGGEST THING IN SELLING. Get ready for your share of this big market without delay!

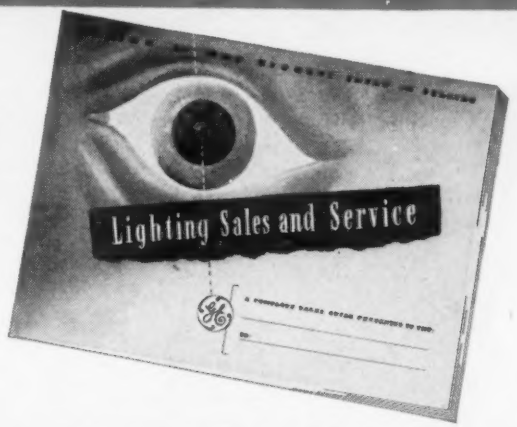
1. WHERE THE PROFITS ARE

2. HOW TO GET SET TO SELL

3. HOW TO GET THE ORDERS

G-E LAMPS

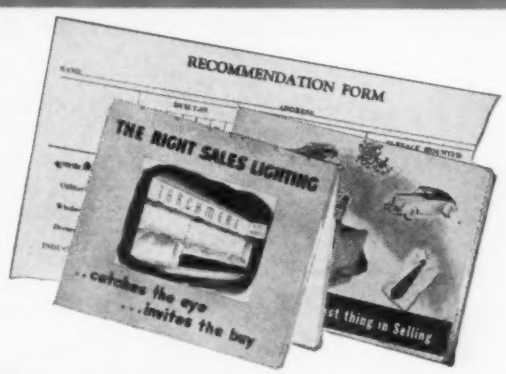
Commercial Lighting Market



In addition to more than a million stores that want to modernize their lighting, several hundred thousand new stores will be built as soon as materials are available. How do you go after your share of this business? Where do you make your profits? LIGHTING SALES AND SERVICE, General Electric's comprehensive and convincing new booklet, gives you the answers. The information in this booklet is the foundation for the whole campaign.

New light sources, such as General Electric SLIMLINE and CIRCLINE Fluorescent Lamps, are sure to be used extensively in commercial lighting. And commercial lighting sales will require use of new sales techniques. Even experienced lighting men will need to refresh their knowledge of lighting. The General Electric-La Salle Training Program for Store Lighting Salesmen will meet that need. It includes five texts, examinations, personal consultation service and a diploma.

In addition, G-E has prepared a pocket-size handbook, "The 3 A's of Store Lighting" for the lighting salesman to carry with him. It's a source of facts he'll refer to again and again.



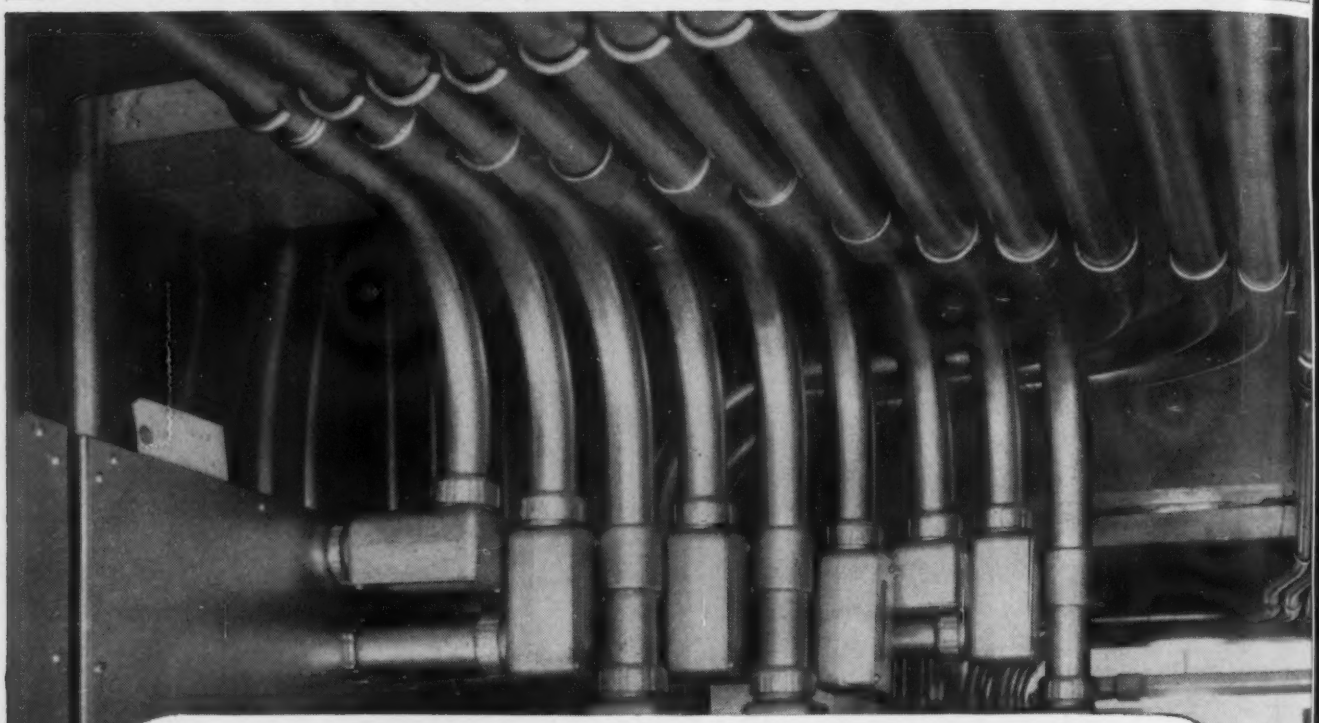
To help the lighting salesman make a convincing and forceful demonstration, General Electric has prepared a visualizer that shows the merchant exactly what modern lighting can do in his store. Every page is designed to build up his receptiveness to good lighting, by letting him SEE what he's buying. To help clinch the sale there's another booklet to leave with the merchant, and a recommendation form to help the salesman make quick and accurate lighting recommendations.

All these sales aids will insure a complete and effective lighting sales job. Be sure to make full use of them . . . they'll help you close many a sale.

For complete details—See your G-E lamp representative!

GENERAL ELECTRIC

FOR SAFETY'S SAKE . . . USE CONDUIT *(Full Weight Rigid Steel)*



Smart Post-War Planning Demands SAFE Wiring Methods

A double responsibility confronts the electrical industry:

1. The obligation to replace makeshift, unsafe wiring systems, installed according to "must do" emergency ideas, forced on industry by war time shortages and regulations.
2. The duty to install only assuredly safe wiring systems in all new post V-Day construction.

Remember this: The only wiring system approved by the National Electrical Code as moisture, vapor, dust and explosion proof in hazardous locations is a standard-threaded rigid conduit.

With standard-threaded rigid steel conduit, such as Youngstown's Buckeye, again available through distributors, there is no reason not to provide dependable wiring protection.

Wherever there is moisture, or vapor, or excessive vibration, or possibility of corrosion, or accumulating dust and dirt, or danger of crushing or other mechanical injury, specify and use Youngstown Buckeye Conduit.

YOUNGSTOWN

THE YOUNGSTOWN SHEET AND TUBE COMPANY

YOUNGSTOWN, OHIO

Manufacturers of

CARBON - ALLOY AND YOLOY STEELS

Ask your distributor for:
Youngstown Buckeye Conduit - Pipe and Tubular Products - Sheets - Plates - Electrolytic Tin Plate - Coke Tin Plate - Bars - Rods - Wire - Nails - Tie Plates and Spikes

Because of their dual operating characteristics

KYLE

TYPE "H" AUTOMATIC

Oil Circuit Reclosers will increase your revenue

Kyle Automatic Oil Circuit Reclosers at strategic points on your lines can be counted on to isolate permanent faults to the shortest possible branches . . . keep the revenue producing current going to the main lines and all unaffected branches.

These dual operating characteristics, as exemplified in the Type "H" Kyle Automatic Oil Circuit Recloser, provide:

1. *Fast Opening* of the Recloser on the *First* and *Second* Operations.
2. *Time Delay Opening* of the Recloser on the *Third* and *Fourth* Operations.

Only a Kyle Automatic Oil Circuit Recloser with these dual operating characteristics will clear all temporary faults and also permit the use of additional sectionalizing devices to isolate permanent line faults.

Advantages of Dual Operating Characteristics

1. All temporary line faults, which comprise 90% of line disturbances are cleared AUTOMATICALLY.
2. Service continuity is increased with resultant higher revenue and better customer satisfaction.
3. Outages are confined to the smallest possible area.

Ask your Line Material Representative to furnish you with complete details on the Type "H" Kyle Automatic Circuit Recloser and how it can be used most effectively to protect your system.

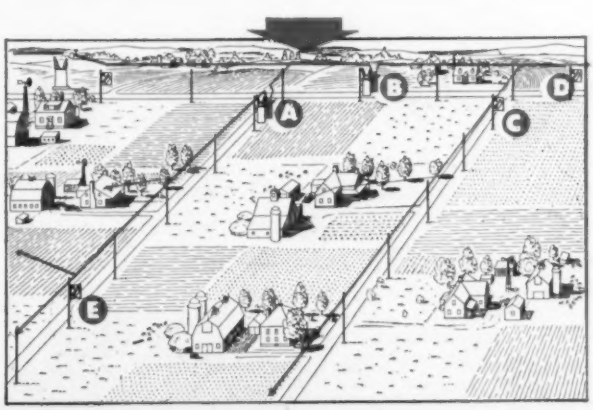
RECLOSER RATINGS: Volts—2400 to 15,000; Amperes—5 to 50; Tripping Current—10 to 100 Amperes; Interrupting Current—150 to 1200 Amperes.

HERE'S HOW IT WORKS:

To protect branch lines from a substation feeder, Kyle Reclosers are located at "A" and "B" to isolate the branches from the main line. Fuses are used on the load side of the Kyle Recloser at "C", "D", and "E" to sectionalize the branch line.

If a fault beyond the sectionalizing fuses is not cleared on the first two operations of the Recloser, it is considered of a permanent nature and the branch line should be isolated by the blowing of the sectionalizing fuse. The Type "H" Kyle Automatic Circuit Recloser permits coordination with the sectionalizing fuse on its third and fourth operations, so that the fuse is blown before the Recloser locks out.

In this way, the line outage is confined to a small portion of the protected system and service is maintained to the remainder of the system.



MADE BY KYLE CORPORATION SOUTH MILWAUKEE WISCONSIN

KYLE Circuit Breakers are Designed and Manufactured for LINE MATERIAL COMPANY MILWAUKEE WISCONSIN

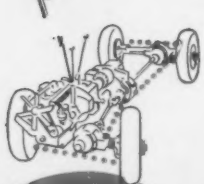
FWDs ARE RUGGED *Dependable* PRIME MOVERS

In everyday duty for utilities, FWDs regularly do 61 jobs. Including special jobs, there are more . . . write for list. For all year 'round utility truck work, you can always depend on FWDs.

FWD trucks . . . rugged, reliable, modern . . . embody the highest development of the original four-wheel-drive principle, pioneered and advanced by FWD since 1910. The true FWD principle with center differential and properly balanced power on all wheels, gives these trucks outstanding mechanical advantages and performance leadership . . . the FWD principle that provides the power and stamina to get through . . . regardless of weather, road conditions or lack of roads . . . with greater assurance and safety. Balanced weight distribution on all four wheels conserves precious tires, replacements, oil and gas. As leaders in performance, economy and style, FWDs are a great "buy" for utilities. Their value is so widely recognized that they are used by over 200 utilities, many of which operate large FWD fleets.

THE FOUR WHEEL DRIVE AUTO COMPANY, Clintonville, Wisconsin

Canadian Factory: Kitchener, Ontario

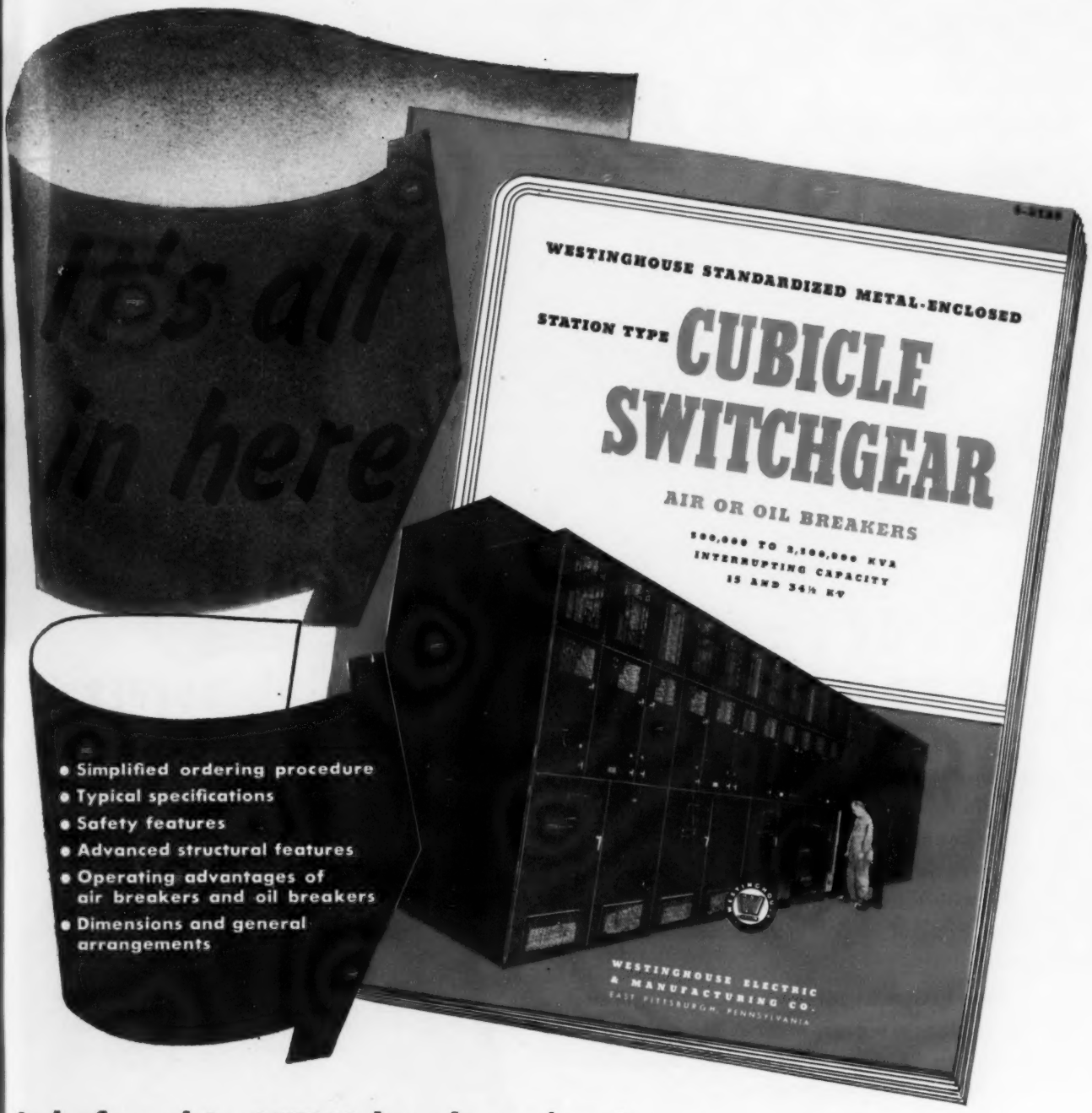


FWD TRUCKS

THE ORIGINAL EXCLUSIVE BUILDERS OF FOUR-WHEEL-DRIVE TRUCKS

More than $75,000,000 in purchases of FWD Model SU alone in the comparatively short span of forty-eight months, emphasizes FWD leadership in this field!

FWD Distributors: ARIZONA—Arizona-Cedar Rapids Co., 401 N. First St., Phoenix; CALIFORNIA—The Four Wheel Drive Auto Co., 1339 Santa Fe Ave., Los Angeles 21, and FWD Pacific Co., 469 Bryant St., San Francisco 7; COLORADO—Liberty Trucks & Parts Co., P. O. Box 1889, Denver 1; IDAHO—Intermountain Equipment Company, Broadway at Myrtle St., Boise; MONTANA—Steffeck Equipment Co., 11 E. Cutler St., Helena; NEVADA—Allied Equipment Co., Reno; NEW MEXICO—The Myers Company, Las Cruces; OKLAHOMA—Halliburton Oil Well Cementing Co., P. O. Drawer 471, Duncan; OREGON—Feenaughty Machinery Co., 112 S. E. Belmont St., Portland 14; UTAH—Cate Equipment Co., 49 E. 9th So., Salt Lake City; WASHINGTON—Feenaughty Machinery Co., 1028 6th Ave., So. Seattle 2, Glenn Carrington & Co., 91 Columbia St., Seattle, and Feenaughty Machinery Co., 715 N. Division St., Spokane; WYOMING—Wortham Machinery Co., 517 W. 17th St., Cheyenne; ALASKA—Glenn Carrington & Co., Nome, Fairbanks, Anchorage.


It's all in here
WESTINGHOUSE STANDARDIZED METAL-ENCLOSED
STATION TYPE CUBICLE SWITCHGEAR
AIR OR OIL BREAKERS
500,000 TO 2,500,000 KVA
INTERRUPTING CAPACITY
15 AND 34½ KV
• Simplified ordering procedure
• Typical specifications
• Safety features
• Advanced structural features
• Operating advantages of air breakers and oil breakers
• Dimensions and general arrangements
WESTINGHOUSE ELECTRIC & MANUFACTURING CO.
EAST PITTSBURGH, PENNSYLVANIA

Ask for this NEW book today!

Here are 24 pages of graphic information covering the planning, ordering and installation of Station Type Westinghouse Cubicle Switchgear . . . with complete pictorial treatment of every phase of construction and operation.

Interior arrangements and dimensions, for example, are given for each type of switchgear. Two "foolproof" systems of mechanical interlocking are described. All pertinent advantages of both air and oil breakers are reviewed.

Whether you are planning to modernize, or install a new power distribution system, this booklet places all the information at your fingertips . . . and will save time in preliminary negotiations and engineering.

Ratings of Station Type Cubicle Switchgear range from 500,000 to 2,500,000 kva interrupting capacity, 7½ to 34½ kv.

Call your Westinghouse office for Bulletin B-3285, or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa. J-60594

Westinghouse
PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE

STATION TYPE
CUBICLE SWITCHGEAR

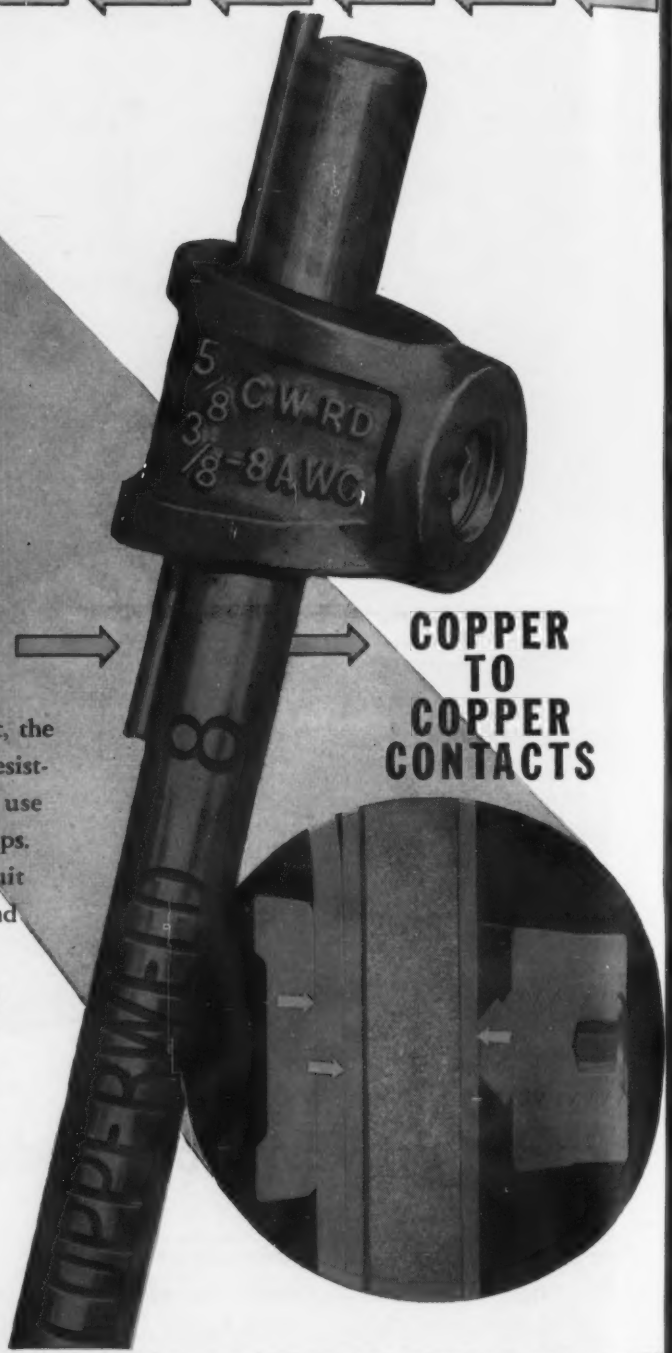
At This Sign

Copperweld

CONQUERS CORROSION

Because there are no dissimilar metals in contact, the possibility of corrosion is eliminated and high resistance connections cannot occur when you use Copperweld non-rusting Ground Rods and Clamps. And with them you provide an all-copper circuit from the top of the pole to the bottom of the ground rod.

They have other advantages, too. The stiff steel core makes the rod easy to drive. The rugged one-piece clamp body provides a simple, dependable connection. Copperweld's unique method of manufacture insures safe, trouble-free ground connections during a lifetime of service

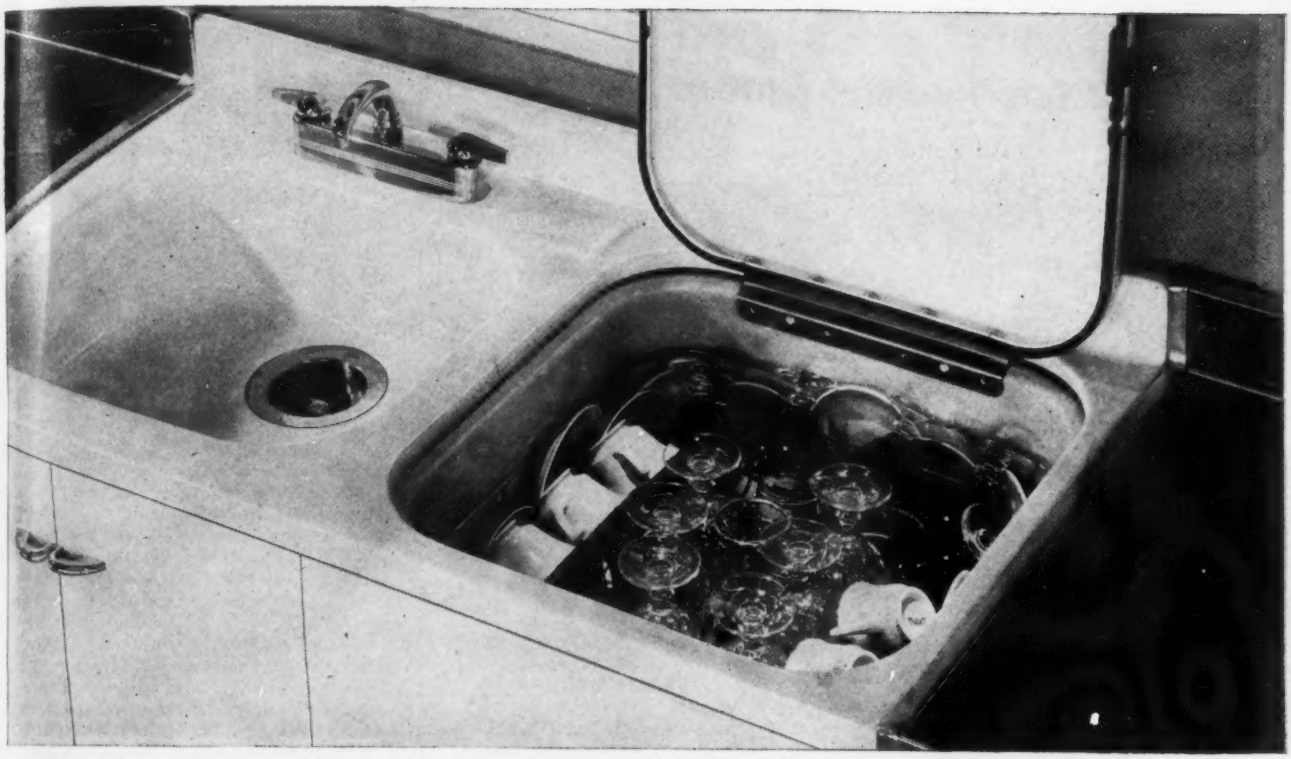


COPPER TO COPPER CONTACTS

Copperweld NON-RUSTING **GROUND RODS AND CLAMPS**

NATIONAL SALES AGENT:

HUBBARD AND COMPANY PITTSBURGH, PA.



New G-E "Electric Sink" • Automatic Dishwasher and Disposall • Expands Market for Major Appliance Dealers

Greatest of All Kitchen Work-savers Virtually Unknown to Consumers . . . Presents Almost Unlimited Market Opportunity Now!

No other single kitchen appliance does as much hard work as the new G-E "Electric Sink."

This new laborsaving unit—General-Electric—pioneered Dishwasher and Disposall combined—washes dishes, rinses dishes, dries dishes, disposes of food waste. All electrically, all in a few minutes, *all automatically.*

Having the advantage of the least saturation of any major appliance, the new G-E Sink is being backed with *twelve times its prewar promotion.* Idea is to make the G-E Dishwasher as commonplace in the American home as the electric refrigerator, range, or washing machine.

No time is being wasted in telling this story to the consumer. A broad-market ad campaign is running in *Life, American Home, Better Homes & Gardens, House & Garden, Parents', and Small Homes Guide.*

G-E Sink advertising also appears on the unique new radio show, "The G-E House Party."

G-E means business—good business—to the alert dealer. Write today for details and special material: General Electric Co., Appliance and Merchandise Dept., Bridgeport, Conn.

NOTE THESE 4 G-E SINK POINTS!

- **Completely Automatic!** The G-E Dishwasher washes and rinses a day's dishes in just a few minutes—*automatically!* Dishes dry in their own steam—cleaner, brighter than by hand. G-E Disposall disposes of food waste *electrically.* Fits most any kitchen sink.
- **Five New 1946 Models!** Positively no prewar models. 1946 models available in the fall of 1945: (1) G-E Electric Sink (Dishwasher and Disposall); (2) Sink with dishwasher; (3) Free-standing Dishwasher; (4) Disposall for installation in present sink; (5) Dishwasher for installation in present work surface.
- **No Trade-Ins:** It's a clean deal—all new merchandise. No trade-ins to worry over and fuss about. High unit sales with a big-volume future.
- **"Heart" of G-E "All-Electric" Kitchen.** There is plenty of evidence to show that women want "All-Electric" Kitchens as soon as they can get them. It's the American homemaking dream. Naturally, no "All-Electric" kitchen would be complete without the G-E "Electric Sink" . . . the very "heart" of these new time-saving. work-saving rooms-of-the-future.

DISHWASHER AND DISPOSALL
REG. U. S. PAT. OFF.
The Complete Table-to-Shelf Dish Job Done Automatically

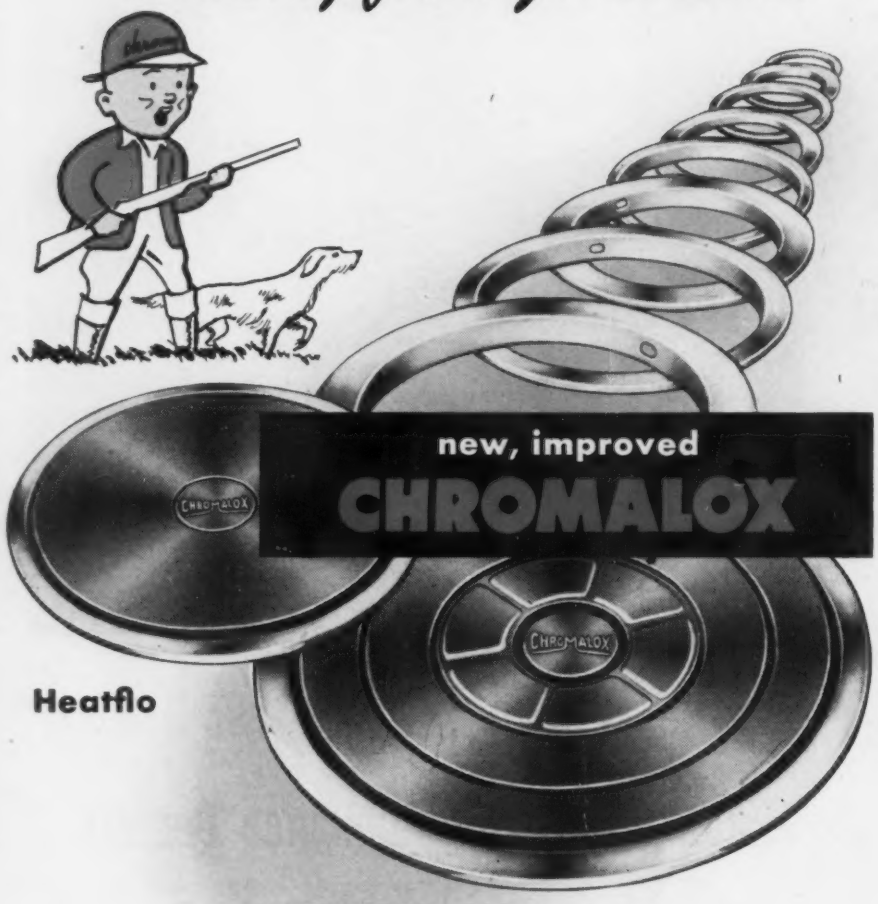
FOR GOOD LISTENING: *Don't miss Art Linkletter, in "The G-E House Party," every afternoon, Monday through Friday, 4 p. m., E.W.T., CBS.*

For Final Victory—Buy and Hold More War Bonds

GENERAL ELECTRIC

Chromy asks:

"Hunting for a Good Line?"



For *all* Electric Ranges

Rebuilding your business?
Reopening your business?
Opening a new business?

SEND IN YOUR PURCHASE ORDERS NOW

No priorities. No WPB Endorsements Needed.

For a top profit electric range unit replacement line you need look no further than CHROMALOX.

It's always a perfect fit when you replace with CHROMALOX *Superspeed* and *Heatflo* Units. The Snap-on Adaptor Rings do it . . . for CHROMALOX Adaptor Rings—installed in a jiffy—stay snug and tight.

A small inventory of *Superspeeds* and *Heatflos* plus inexpensive Snap-on Adaptor Rings, service all makes of Electric ranges. Less manpower, time and inventory *equals* more profit to you per call.

Edwin L. Wiegand Co.

7540 Thomas Boulevard Pittsburgh 8, Pa.

Montgomery Bros., 420 S. San Pedro St., Los Angeles, Calif.; 2333 N.W. Westover St., Portland 10, Oregon; 61 Fremont St., San Francisco 5, Calif.; 911 Western Ave., Seattle 4, Wash.
The Peterson Co., 1921 Blake St., Denver 2, Colorado

on new ranges and for replacements

CHROMALOX

means *Electric Cooking at its Best!*

RC-8

PRODUCTS

that are news

Silicone Rubber (900)

A silicone rubber, going under the trademark name Silastic, has been made commercially available by Dow Corning Corp. in stocks for molding, extruding, coating and laminating. These rubbery organo-silicon oxide polymers are said to remain elastic after heating at temperatures up to 500°F and to retain flexibility at temperatures as low as -70°F.

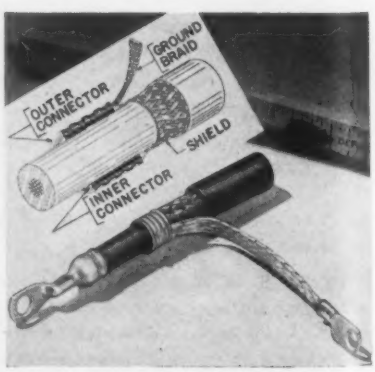
According to the announcement, Silastic can be used on lead wire, for molding flat sheets, coating glass or asbestos cloth for gaskets, diaphragms, tape and electrical insulation, insulating wire wound resistors and for other uses. Laminates may be made by curing under pressure multiple layers of Silastic coated inorganic fabrics.

Silastic coatings adhere to glass, vitreous enamel, iron, steel and aluminum and are said to be resistant to oil and salt brines at elevated temperatures, to have exceptional temperature stability and to be waterproof.

Stocks now available have tensile strength of from 200 to 330 lb. per square inch, elongation from 70 to 115%, electrical properties as follows: dielectric constant at 1,000,000 cycles of 5.0 to 7.5; power factor at 1,000,000 cycles of 0.13 to 0.18%; dielectric strength of 500 volts per mil. According to the manufacturer, properties, especially tensile strengths, are being improved steadily.

Connectors (901)

Burndy Engineering Co. has announced new terminals and ground tap connectors specially designed for coaxial and shielded cable. The connector for the braided conductor or shield may be installed with a braid tap to make a terminal connector or ground tap or it may be used merely to anchor the shield to prevent the braid from slipping. Connection with the inner conductor is made with a Hylug having an insulation shroud. The lug is indented to the conductor and the shroud is crimped to the insulation. The outer conductor or shield is grounded or terminated by a connection which consists of two ferrules and a braided tap which is equipped with a Hylug.



Fire Extinguisher (902)

A new portable fire extinguisher, the Alfite Speedex, has been announced by American-LaFrance-Foamite Corp. It comes in three sizes, and uses carbon dioxide as the extinguishing agent.

WESTINGHOUSE STARTS THE SPADEWORK FOR A BUMPER CROP OF POSTWAR SALES IN THE FERTILE RURAL MARKET

These two are typical of the full-page ads appearing regularly in

COUNTRY GENTLEMAN · FARM JOURNAL
PROGRESSIVE FARMER · ELECTRICITY ON THE FARM

A total readership in rural America of 22,440,000

TOMORROW..more and more farm folks will know
"There's a lift to living Electrically!"
"Gee, mom, remember how we used to have to scrub 'em?"
Westinghouse
Electric Ranges and Water Heaters
Tender Spring Broilers
12 months of the year..with
"REACH-IN CONVENIENCE"
Westinghouse
Home Freezers

The farmer's in the bucks. Farm modernization is first in postwar plans. Electric power is a "must" for profitable farming. America's Rural Market is plenty fertile for a bumper crop of Electric Range and Home Freezer sales!

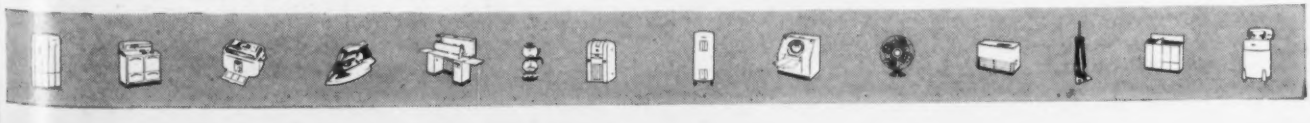
This spadework NOW will clinch volume sales for Westinghouse retailers. Dominating full-page ads appear consistently in four big rural magazines that blanket Rural America.

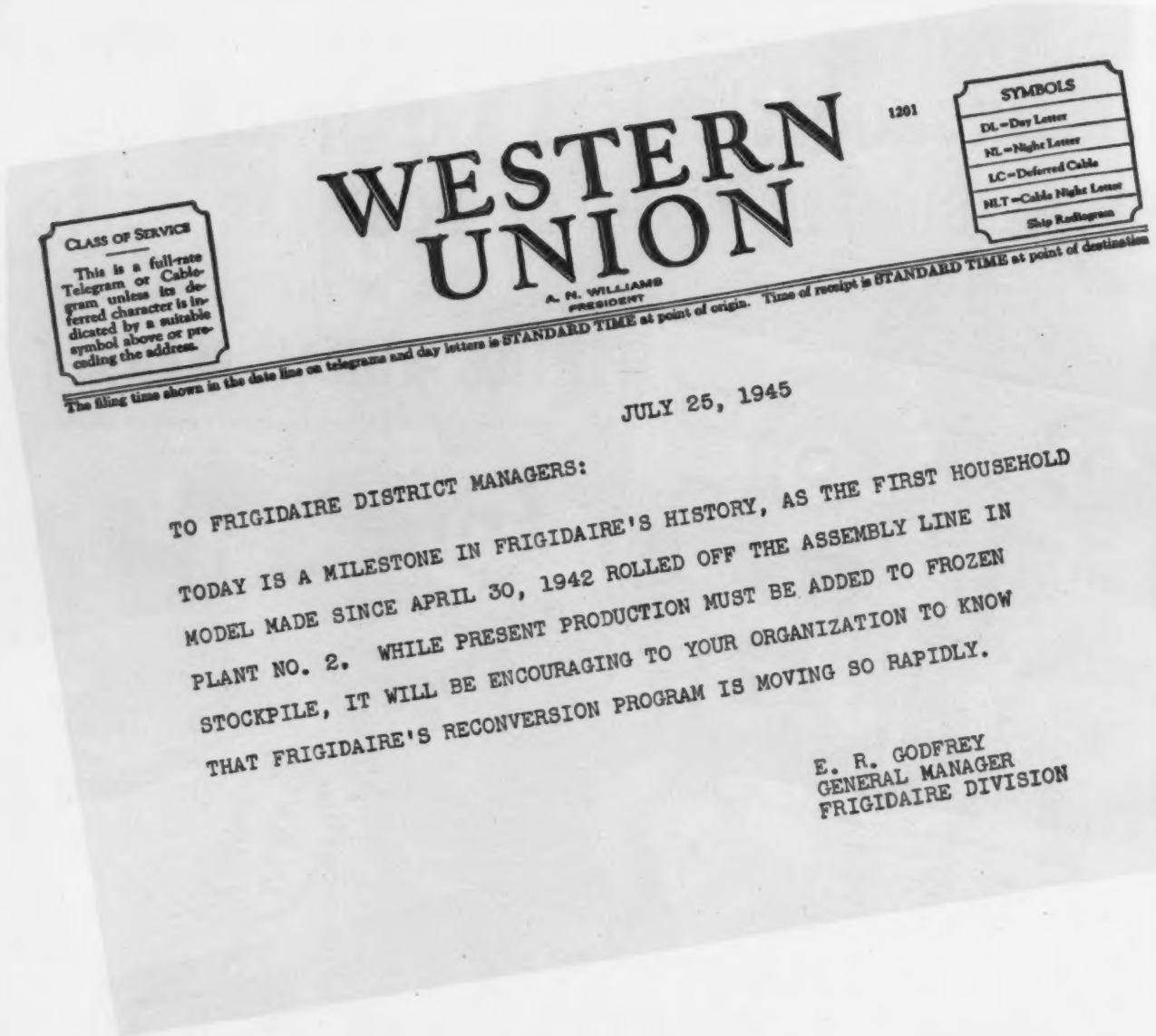
Get in on the harvest that's sure to follow this spadework. Ask your near-by Westinghouse Appliance Distributor for the complete story of the Westinghouse Full Line Franchise.

WESTINGHOUSE ELECTRIC CORPORATION
APPLIANCE DIVISION · MANSFIELD, OHIO
Plants in 25 Cities . . . Offices Everywhere

30 MILLION PRE-WAR
Westinghouse
ELECTRIC HOME APPLIANCES
YOUR PROMISE OF STILL FINER ONES TO COME

Tune in: John Charles Thomas, Sunday 2:30 EWT., NBC • Hear Ted Malone, Monday through Friday, 11:45 A.M. EWT., American Broadcasting Company Network





WESTERN UNION

1201

A. N. WILLIAMS
PRESIDENT

CLASS OF SERVICE
This is a full-rate Telegram or Cable-gram unless its de-ferred character is in-dicated by a suitable symbol above or pre-ceding the address.

SYMBOLS
DL = Day Letter
NL = Night Letter
LC = Deferred Cable
NLT = Cable Night Letter
Ship Radiogram

The filing time shown in the date line on telegrams and day letters is STANDARD TIME at point of origin. Time of receipt is STANDARD TIME at point of destination

JULY 25, 1945

TO FRIGIDAIRE DISTRICT MANAGERS:

TODAY IS A MILESTONE IN FRIGIDAIRE'S HISTORY, AS THE FIRST HOUSEHOLD MODEL MADE SINCE APRIL 30, 1942 ROLLED OFF THE ASSEMBLY LINE IN PLANT NO. 2. WHILE PRESENT PRODUCTION MUST BE ADDED TO FROZEN STOCKPILE, IT WILL BE ENCOURAGING TO YOUR ORGANIZATION TO KNOW THAT FRIGIDAIRE'S RECONVERSION PROGRAM IS MOVING SO RAPIDLY.

E. R. GODFREY
GENERAL MANAGER
FRIGIDAIRE DIVISION

Less than seven weeks after the War Production Board authorized resumption of refrigerator manufacture, newspapers carried the news that the "first refrigerator produced after reconversion" was a Frigidaire. This event marked the beginning of a new era in the refrigeration business and unparalleled opportunities for Frigidaire Dealers and Salesmen.

Look to Frigidaire

For Leadership in Manufacturing

For Excellence in War Production

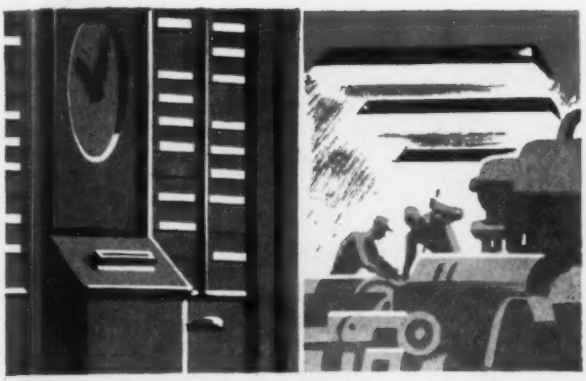
ARMY E NAVY

FRIGIDAIRE
Division of
GENERAL MOTORS

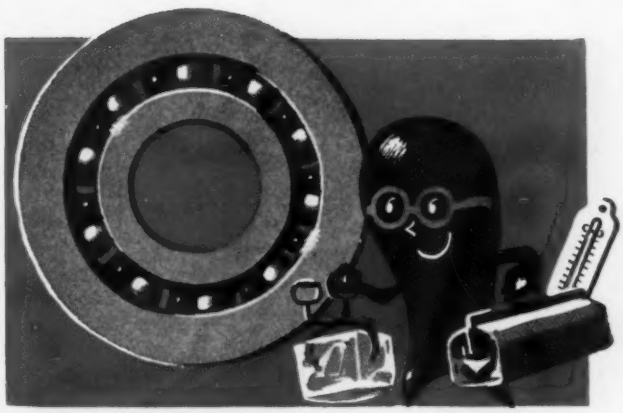
DAYTON 1, OHIO • LEASIDE 12, ONTARIO

REFRIGERATORS • RANGES • WATER HEATERS
HOME FREEZERS • ICE CREAM CABINETS
COMMERCIAL REFRIGERATION • AIR CONDITIONERS
BEVERAGE, MILK, AND WATER COOLERS

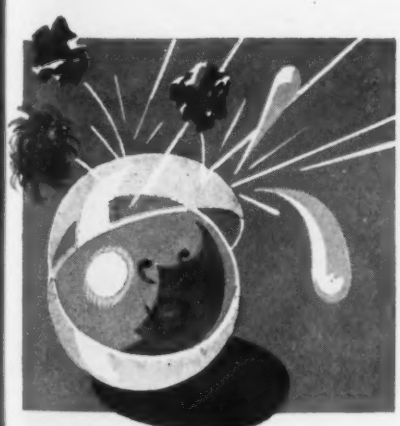
SPECIAL BEARING GREASE HELPS PREVENT FAILURE!



1. Overhauling burned-out or scored bearings is quite an expensive job. But many costly maintenance hours can be saved if you use Union's special bearing grease.

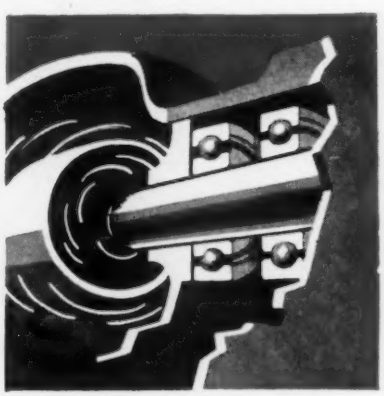


2. This grease, BALLROLL, was developed by Union Oil to help prevent bearing failure in electric motors. It combines high anti-friction and cooling properties.



3. BALLROLL seals out dirt, lint, dust, and other foreign matter and protects the finely machined surfaces of the bearings against rust caused by atmospheric moisture.

4. A melting point of 350° keeps BALLROLL from running out. And it won't throw off, gum up, or harden. BALLROLL is now homogenized to give it the uniform consistency that is so desirable.



5. A short-fibered grease with a very low torque, BALLROLL shears easily and quickly, permitting the motor shaft to turn with least resistance and deliver maximum horsepower.

Try some of this special bearing grease that helps prevent failure. Your Union oilman will be glad to furnish more information and deliver a supply.

BALLROLL

Another **UNION OIL** *Success-Tested Product*

UNION 76

From one . . . many!

YOU can make many different kinds of toast with a Proctor—the "toaster with a crisper!" Light, dark, soft, crisp, Melba . . . an almost infinite number of kinds. No wonder the Proctor *completely* automatic toaster was a newsmaker from the day it hit the market!

Good post-war numbers!

And speaking of numbers, Proctor has more newsmaking features on tap . . . ready for post-war appliances. Plan now to stock and sell the "good numbers" in Proctor's great post-war line!

Meanwhile, keep on buying WAR BONDS.

PROCTOR

PROCTOR ELECTRIC COMPANY, DIVISION OF PROCTOR & SCHWARTZ, INC., PHILADELPHIA 40, PENNA.

NEWSMAKER IN APPLIANCE MERCHANDISING

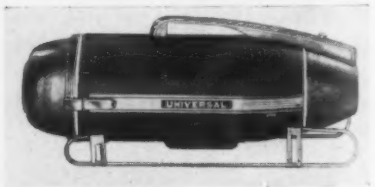
Electric Range (903)

Hotpoint is resuming electric range production with three models, a deluxe, a moderate priced model and one in the lowest price range. The deluxe, or Masterpiece (illustrated), will have fully automatic clock control timer, Calrod heating units and giant thrift cooker unit, twin Venetian lights, illuminated switch dials, warming compartment, oven racks for roasts, condiment set. It will require a floor space 39 in. wide, 25 in. deep. The moderate priced Hostess will include automatic clock control and timer, vanity Venetian lights, indicating switch dials, 6-qt. cooker and Calrod heating units; will occupy floor space 37 in. wide, 25 in. deep. The Century, in the low price range, will have a one-piece porcelain cooking top, a newly designed storage bin across the entire front of the range, Calrod heating units, standard Hotpoint oven. Over-all floor space requirement will be the same as for the Hostess model.

Vacuum Cleaners (904)

Landers, Frary & Clark will produce three types of vacuum cleaners—cylinder, conventional floor model and hand model—and hopes to allocate limited quantities in the fourth quarter of the year, it was announced recently.

The tank type cleaner will feature a "tattle tale" light, which flashes when dirt bag needs emptying; an air tight connection between cleaner and hose; a thread picking.



self cleaning nozzle; germ trap which cleans and purifies air; radio interference eliminator; 13 attachments. Weight will be 14½ lb., length, 24 in.; height, 9½ in.; width, 7½ in.

The brush type cleaner will have five attachments; will be tobacco brown with red lettering; will have a streamlined headlight.

The hand model will have a deodorizer, moth exterminator and blower attachment; will weigh 4 lb.

Alarm Clocks (905)

Warren Telechron has announced production on two new models of electric alarm clocks, the "Telalarm" and "Conductor". The former is priced at $5.50, the latter at $4.50, plus tax.

Announcing the New BENDIX Automatic Home Ironer!

Note the unusually wide clearance between shoe and roll—the Bakelite work table—and the three accessible open ends of shoe and roll.

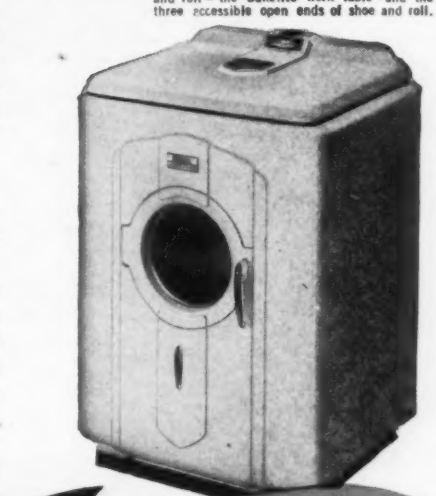
HERE it is—the new Bendix automatic Home Ironer. It's all you'd expect from the people who pioneered and perfected the marvelous Bendix automatic Home Laundry. And it's destined for an equally eager response from the public, because it is equally deserving of being preferred.

Three usable open "ends"! Here is the *only* ironer with three open "ends"—two usable open ends on the shoe, one on the roll. Usage is simplified, and the variety of garments it accommodates is actually multiplied. On *this* ironer, you can really iron a shirt or press a suit.

It's easier to Use! Unique under-the-roll shoe means greater flexibility; wider usefulness; simpler, speedier operation. Adjustable for both leg clearance and knee controls. Fits the operator—she doesn't have to cramp herself to fit the ironer. Series of features include dual thermostat controls, dual speeds, illuminated control indicators, perfectly placed Bakelite work table. "Learning how" is child's play. Usage is free from all needless effort or fatigue.

Perfect Visibility! Only with the under-the-roll shoe, can the operator see so well what she is doing. Additional advantages make visibility unequalled. At a touch, the correctly located shoe opens to a clearance of *four inches!* Controls for motor, heat and temperature are all illuminated. Everything is convenient to sight and touch.

Ninety-nine out of a hundred women say, "We want an ironer that's *easy to use—that irons everything!*" The Bendix is precisely that kind of an ironer. You'll want to see it—if for no other reason than to keep abreast of the best. Here it is—and it's a *Bendix!*



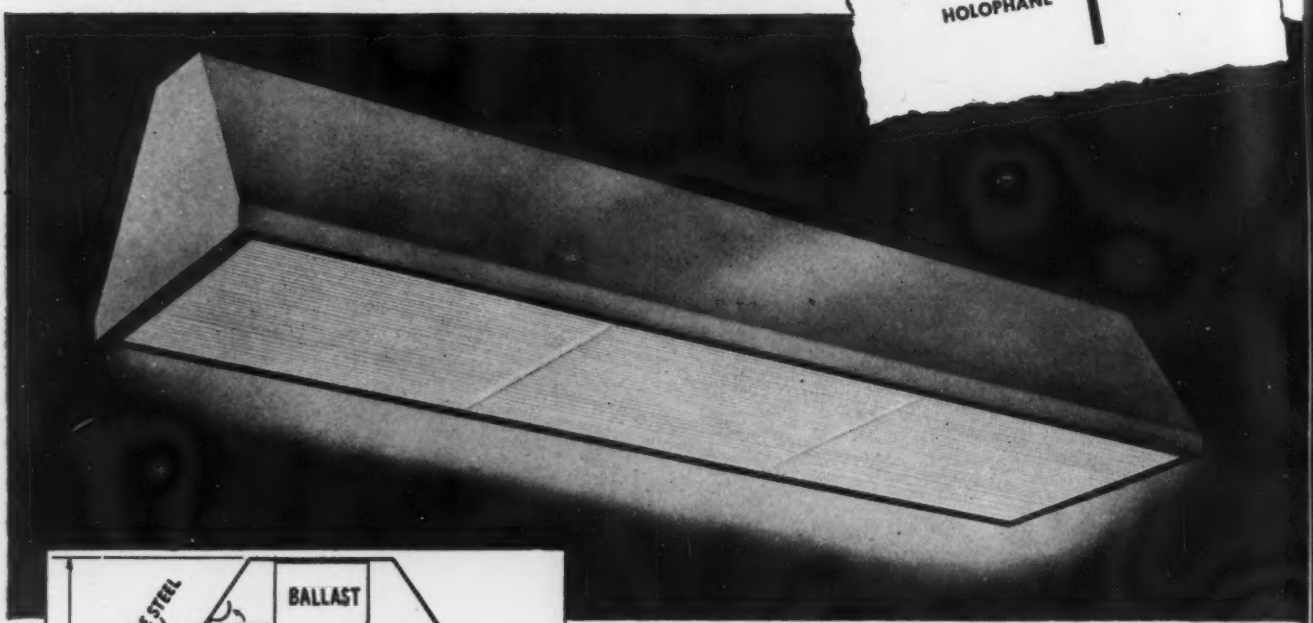
More women want to own the Bendix automatic Home Laundry, than any other "washer." Now you can team this washday miracle up with the one-and-only Bendix automatic Home Ironer—for double sales! For further information on the amazing new ironer, phone your distributor, or wire direct to Bendix Home Appliances, Inc., South Bend, Indiana.

BENDIX automatic Home Ironer

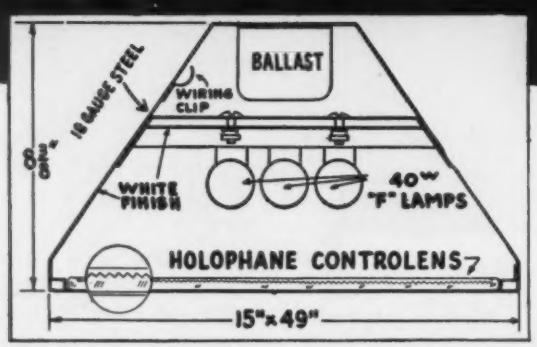
Bendix Home Appliances, Inc., South Bend, Indiana . . . Pioneers and Perfectors of the Automatic "Washer."

HOLOPHANE RESEARCH Produces the first in a series of NEW CONTROLESCENT UNITS for Better Lighting

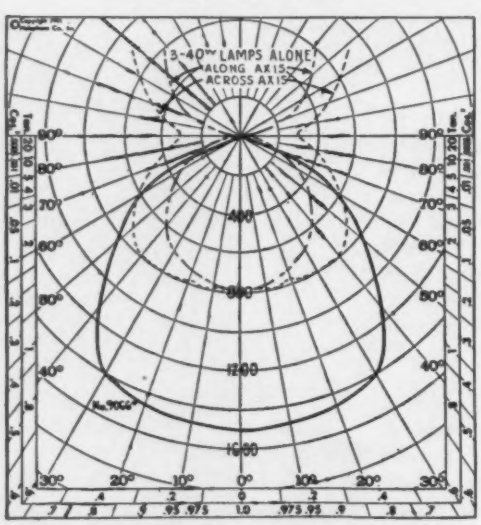
Holoflux
HOLOPHANE · FLUORESCENT



Controlescent Unit No. 9066—Accommodates three 40 Watt Fluorescent lamps; No. 9065 for two 40 Watt Fluorescent lamps



Lateral section of unit



Candlepower Distribution Curve
3-40 "F" Lamps 6300 Lumens

Holophane offers this new HOLOFLUX unit as an important advance in CONTROLESCENT (Controlled Fluorescent) LIGHTING.

OUTSTANDING FEATURES . . .

- 3 large HOLOPHANE "HI-STRESS"* CONTROLENSES (each 14" x 16") accept and direct high angle light to useful zones.
- Totally enclosed construction reduces temporary depreciation and saves in maintenance; smooth outer Controlens surface is easily cleaned.
- Controlenses shield lamps—eliminate glare and discomfort.
- Heavy 18 gauge steel housing—reinforced for extra strength.
- Available for 2-40 watt or 3-40 watt fluorescent lamps.
- Easily installed—two ½" female fittings provided for ½" pipe suspension.

*HI-STRESS withstands extreme mechanical shock

WRITE for Holophane Engineering Data and full details. No obligation.

HOLOPHANE COMPANY, INC.... *Lighting Authorities Since 1898*

342 MADISON AVENUE, NEW YORK 17 • Holophane Co., Ltd., 385 Yonge St., Toronto, Can.

Pacific Coast Representatives:—R. G. Dummel, San Francisco; F. van Gilluwe, Los Angeles
Distributors, General Electric Supply Corp.

COMING!

THE REFRIGERATORS THAT WILL START YOUR BUSINESS RIGHT... AND KEEP IT RIGHT!

There are two ways to look at your coming refrigerator business.

One way is to look only at your "immediate" sales in the first flush of buying.

From that point of view, just about any refrigerator line is good—no doubt about it!

But a more farsighted view will tell you that to start your business *right—and keep it right*—you want the refrigerator line that's *best* for your business!

We sincerely believe that the G-E Refrigerator line is your best foundation for a prosperous business—a *lastingly* prosperous business! Here's why:

- **The war has brought** home the importance of *dependability* in refrigerators. The fame of the G-E "sealed-in-steel" unit is more widespread than ever.
- **G-E Refrigerator** production plans are geared to today's markets—to the needs of *your* prospects. We are concentrating our *first* production on the 7-foot de luxe model described at left, plus a *standard* 7-foot model, and a limited number of 6-foot standard models.
- **These models are** *most* wanted *today*—as established by extensive consumer surveys. In addition, our policy of concentrating our first production on fewer *models* means there will be a greater *number* of G-E Refrigerators.
- **Later, of course,** G.E. will produce other models—new models with new and profitable features. Both our "immediate" models, now well along in production, and our later models, are G.E. *all the way through*.

A firm foundation for *your* business!

This 7-foot G-E de luxe refrigerator is in production *now*. It's the most saleable, profitable box you could handle!

The *size* is right (independent surveys show the 7-foot size is more wanted today).

The *features* are right: Ample storage space for frozen foods inside "Super Freezer." Adjustable sliding shelf. Big (10.1-quart capacity) high-humidity drawer. 550-cubic inch fresh meat compartment.

And its *price* will be right, too—a "real-value" price that people want to pay, but with ample margin for *you!*

If you're interested in establishing a prosperous, *lasting* refrigerator business, then G-E is your line!

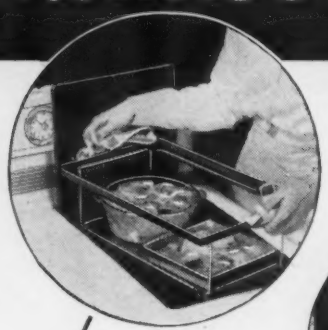
GE Refrigerators

"THE REFRIGERATORS MOST PEOPLE WANT MOST"

GENERAL ELECTRIC

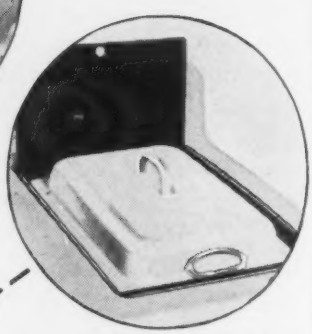
The Public Eye is focussed on the Monarch Roaster Range

. . . for cookies, pies and light baking



. . . for casserole dishes and complete meals

. . . for juicy, tender roasts



. . . high domed cover to increase roaster depth

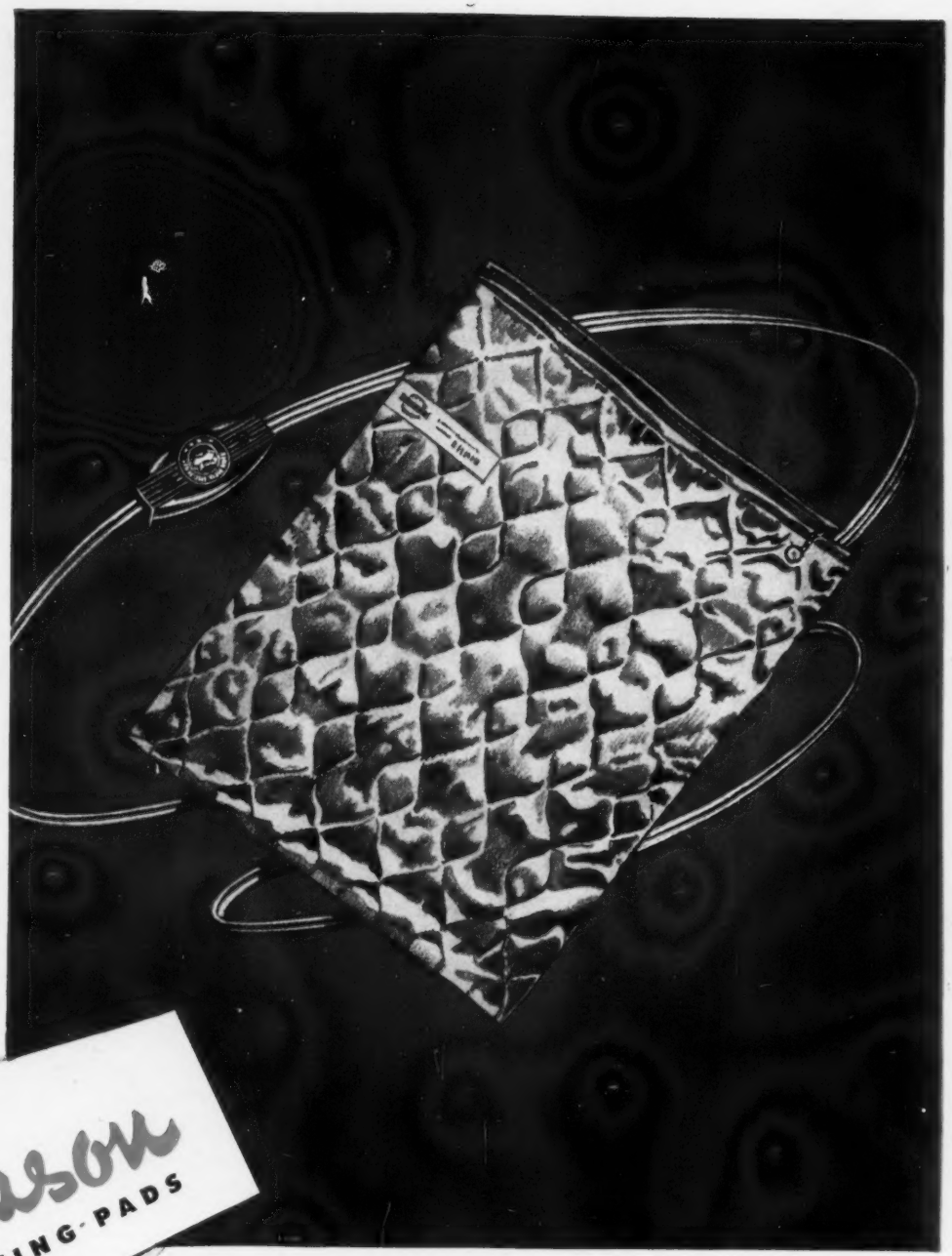
From national magazine advertising and radio announcements, inquiries are pouring into the office for Monarch Roaster Range literature, delivery expectation, nearest Monarch dealer, etc. The volume of these inquiries indicates, definitely, that the public is focussing its eye on Monach — that the exclusive Monarch Roaster Range will ride the crest of electric range popularity. Write today for franchise particulars.

MALLEABLE IRON RANGE CO.
3995 Lake St. Beaver Dam, Wisconsin

COAL-WOOD, ELECTRIC, GAS and COMBINATION RANGES

Monarch-Paramount

RANGES AND HEATERS



Again it's SAMSON Heating Pads for quality features that mean volume sales and customer satisfaction! Patented SAFE-T Circuit, with 3 Fixed Heats, each controlled by 4 precision thermostats. Permanently sealed 100% wetproof cover of Du Pont Fairprene. Zelan-treated water repellant and stain resistant extra covers. Cushion-comfort padding. Strain-relief switch with exclusive "Touch-Tell" indicator for night use. 8-foot cord. Each pad individually boxed to form a compact, self-selling counter display.

Samson
HEATING PADS

FACTS ABOUT SAMSON UNITED TODAY AND FOR THE FUTURE

As you read this, another Samson electrical appliance—the Samson Heating Pad—is now in production. Initial shipments will be limited, but as fast as more of our war-expanded facilities are released for peacetime production, larger and larger quantities will go forward to Samson distributors.

In addition to the Samson Duo-Dial-A-Heat Flatiron which dealers are already receiving, the Samson Safe-flex Rubber Bladed Fan and the Samson Variable Control Table Range will be made available as soon as conditions permit. Watch for news of these and other Samson profit-making appliances.

SAMSON
ELECTRICAL APPLIANCES

SAMSON UNITED CORPORATION, ROCHESTER 10, N.Y.

Samson United of Canada, Limited, Toronto

Mr. Tops, the Paragon symbol of top quality.

TOP QUALITY POULTRY HOUSE TIME CONTROLS

Model PS

Model 301

TO insure Fall delivery place your order now for Paragon Top Quality Poultry House Time Controls. Paragon "PS" models are designed for both morning and evening lighting, with dimming period for roosting. The Paragon Model 301 is designed essentially for morning lighting only. It is a heavy duty, industrial type time switch adaptable to poultry house lighting. It is truly a superior instrument of high quality and low price. All Models are synchronous motor operated and available . . . Without priority ratings.

Send for Authoritative Bulletin

Paragon has prepared a 4-page, 2 color bulletin containing authoritative information relative to poultry house lighting control . . . location of lights, selection of light control switches, etc. It summarizes the recommendations of leading poultry authorities and gives complete data regarding the wide range of Paragon poultry house time switches... Also, attractive envelope stuffer available in quantities for your distribution.

PARAGON ELECTRIC COMPANY
736 Old Colony Building
Chicago 5, Illinois

Paragon Chicago
BUILDERS OF ELECTRICAL EQUIPMENT SINCE 1905

Circular F Lamp (906)

Sylvania will manufacture a circular fluorescent lamp for ceiling fixtures, table and other portable lamps. A translucent rotating base permits turning the lamp a full 180° without removing it from lamp holders, the manufacturer states, and by reversing the lamp's position it may be turned another 180°. The translucent base picks up light from the lamp and tends to eliminate dark spots in the ring of light. A typical lamp has an outside diameter of 12 in., is rated at 32 watts, 2,500-hour life and has an output of 1,600 lumens from a T-10 bulb. The lamps will be available also in 8½- and 16-in. outside diameters. They operate with conventional fluorescent lamp ballasts provided with manual or automatic starter control.

Series Slimline (907)

Westinghouse has announced that it will make the series slimline fluorescent lamps, when designs are completed and war conditions permit. Nominal over-all length will be the same as that of the present multiple types, including the lamp and lampholders, but new safety bases having no exposed contacts will be provided, according to the manufacturer. It was stated that hot cathode probably would be used in the majority of lamps but that cold cathode would be made available if necessary.

Instant-Start F Lamp (908)

An instant-start 40-watt fluorescent lamp announced by Westinghouse incorporates a feature claimed to eliminate need for a special lampholder. A metal tab is riveted to the pins of a medium bipin base, connecting them within the lamp itself and preventing possible damage to cathodes if improper or defective lampholders are used. These lamps will not operate on regular starter type equipment and can be used only with instant-start ballasts.

Recessed Troffer (909)

R. & W. Wiley is offering a new "recessed troffer" fluorescent fixture, which it states will fit in as little as a 7-in. space between the true and false ceiling into which it is recessed. It fits into a ceiling opening 12 x 48 in. and is made for both individual installation or continuous runs. It is furnished in open, louvered or ribbed glass models for two, three or four 40-watt lamps with instant start or starter ballasts.

Work Light (910)

Swivelier Co. has improved its Work-Lite model for machine tools, assembly benches, desks and similar applications. The improved unit comes with Greenfield cable and leads for direct attachment to the outlet box or transformer, thus grounding the unit. It may be secured with arms from 12 to 30 in. long; with cone, bell, parabola or acorn shade; with or without removable glass lens, frosted, clear or daylight.

Kitchen Unit (911)

A new fluorescent unit, called the Kitchener, is being manufactured by the A. L. Smith Iron Co. The fixture uses two 20-watt lamps. It is finished in white baked enamel, with highly polished trim and end caps. Starters are on the ends of the channel. Although designed primarily for the kitchen, it is adaptable to other rooms, the manufacturer states.

G-E HOME LAUNDRY EQUIPMENT IS BACK!

Famous G-E One-Control Wringer Washers are rolling off the production line, *now.*

All G-E Home Laundry Equipment backed up by coast-to-coast advertising. In leading, top-circulation magazines every month. On the air, over a nationwide network, 5 days a week.

TELL YOUR CUSTOMERS *to listen to Art Linkletter, in the "G-E House Party," every afternoon, Monday through Friday, 4 p. m., E.W.T., CBS.*

• Biggest market in appliance history waiting! Feature the complete G-E Line!

Now you can take orders for General Electric Home Laundry equipment!

The G-E Home Laundry factory is again manufacturing washers, ironers, and dryers.

You'll get your first G-E One-Control Wringer Washer very soon. And the complete line will follow, fast.

Big Preference for G.E.!

There's a huge market waiting to snap up laundry equipment. (WPB says 4,621,000 people want washers.) And there's a big preference for General Electric products. (Surveys show that 53 out of 100 women believe G.E. makes the best electrical appliance for the home.)

So plan to feature the complete G.E. line—for a big, big future. Because *we're* planning great things for the future, too. Bigger than ever promotion. Constant improvements in design. And a new G-E Automatic Washer that's going to revolutionize the industry!

Get Started Now!

Send for the G-E Self-Starter Package. It contains all the sales-promotion material you need to get back in the home-laundry business. Your distributor has it. Get it *today!*

"THE APPLIANCES MOST WANTED BY MOST WOMEN"

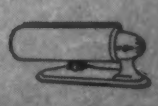
GENERAL ELECTRIC

G-E Washer! Convenient one-control wringer. Gentle, thorough "Activator Action." Trouble-free "Permadrive Mechanism."

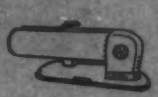
G-E Dryer! New! Automatic "tumbler" action. Dries clothes *indoors*, fast.

G-E Ironer! Automatic! Flatplate! Simple to operate. 300-square-inch board.

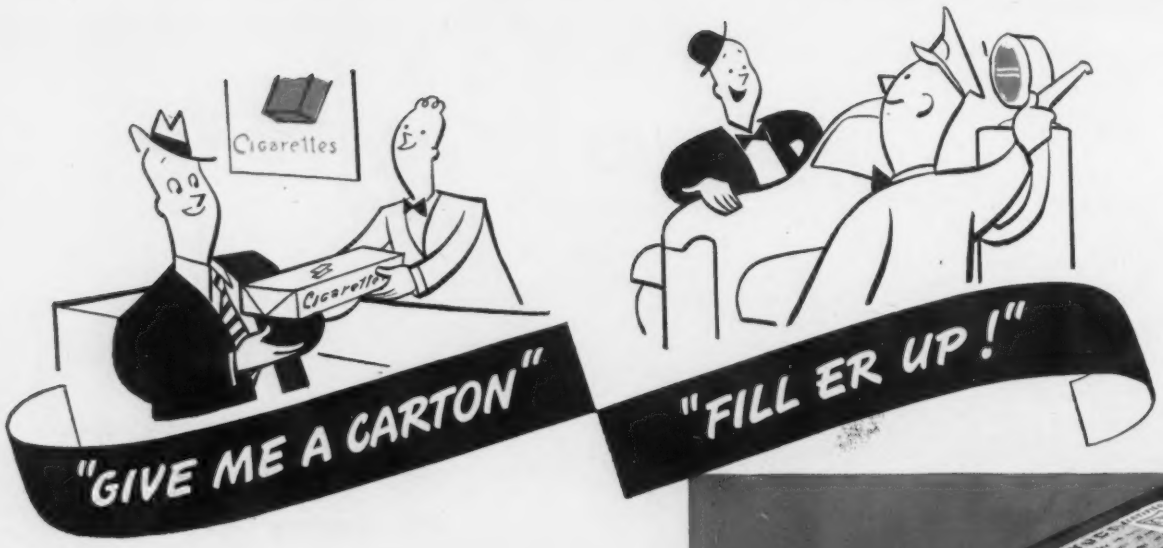
Complete G-E Line—all with wonderful sales features!



G-E Portable Rotary Ironer! Weighs only 33 pounds. To sell at a bargain list.



New G-E Automatic Portable Rotary Ironer! Light. Efficient. A price leader!



. . . and won't it be great when you can always give your fixtures the sales appeal of

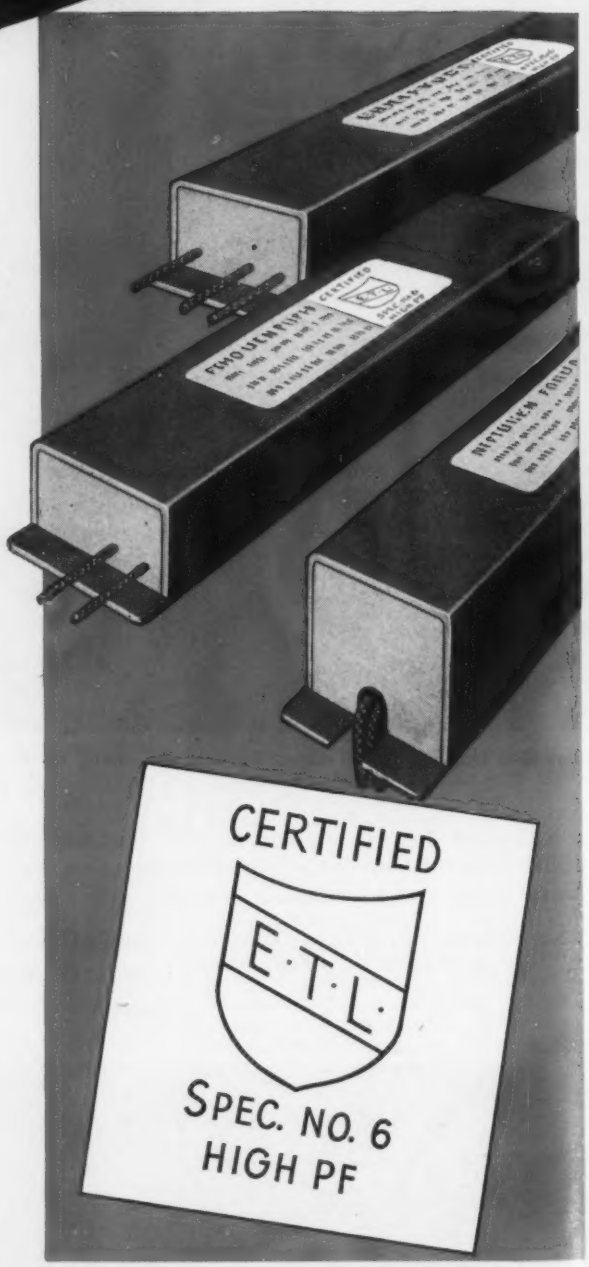
Certified Ballasts

Yes sir, there's no getting around it. Fluorescent fixtures do have greater sales appeal with Certified Ballasts. And here are the reasons why:

1. **Certified Ballasts are made** to give top performance and dependable service . . . as your customers know.
2. **They're built** to definite specifications . . . to assure better lamp performance, as leading fluorescent tube makers recognize. Because, with Certified Ballasts, they will guarantee lamp performance.
3. **They're subject** to exhaustive testing by famous Electrical Testing Laboratories, Inc., and Certified by them as meeting the specifications.

Good reasons why you'll want the confidence-building power of Certified Ballasts behind *your* fixtures!

Incidentally Certified Ballasts will be ready as soon as materials are freely available . . . *ready as soon as any.* Make this Certification label part of your buying specifications . . . for greater sales appeal tomorrow!



Certified Ballast Manufacturers

MAKERS OF BALLASTS FOR CERTIFIED FLUORESCENT LIGHTING FIXTURES

2116 KEITH BUILDING • CLEVELAND 15, OHIO

Another Famous First!

SYSTEMEERING*

FOR GREATER PROFITS

Business experts from the Burroughs Adding Machine Co., Moore Business Forms, Inc. and the Shaw-Walker Co. join with Universal under the direction of Dr. O. P. Robinson, Professor of Retailing, New York University, to bring the latest retailing techniques to dealers through Universal's new Systemeering Guide.

FOR PROFIT-WISE DEALERS · *A Complete Guide to the Scientific Control of Retailing*

Following the sensational success of Moderneering—The Store Planning Guide, Universal now offers Systemeering—The Guide to Profitable Retailing which points the way to creating and conserving a surplus by means of planned and coordinated management.

Systemeering is another big step in Universal's "Help the Dealer" program which started with the "U" Plan for "V" Day and will continue in high gear as the new Universal appliances and housewares become available.

REQUEST YOUR COPY TODAY!

*Copyright 1945, Landers, Frary & Clark

UNIVERSAL

LANDERS, FRARY AND CLARK • NEW BRITAIN, CONN.

Universal Electrical Appliances Distributed in Canada Exclusively by Northern Electric Company, Ltd.

Systemeering Division EW
Landers, Frary & Clark, New Britain, Conn.

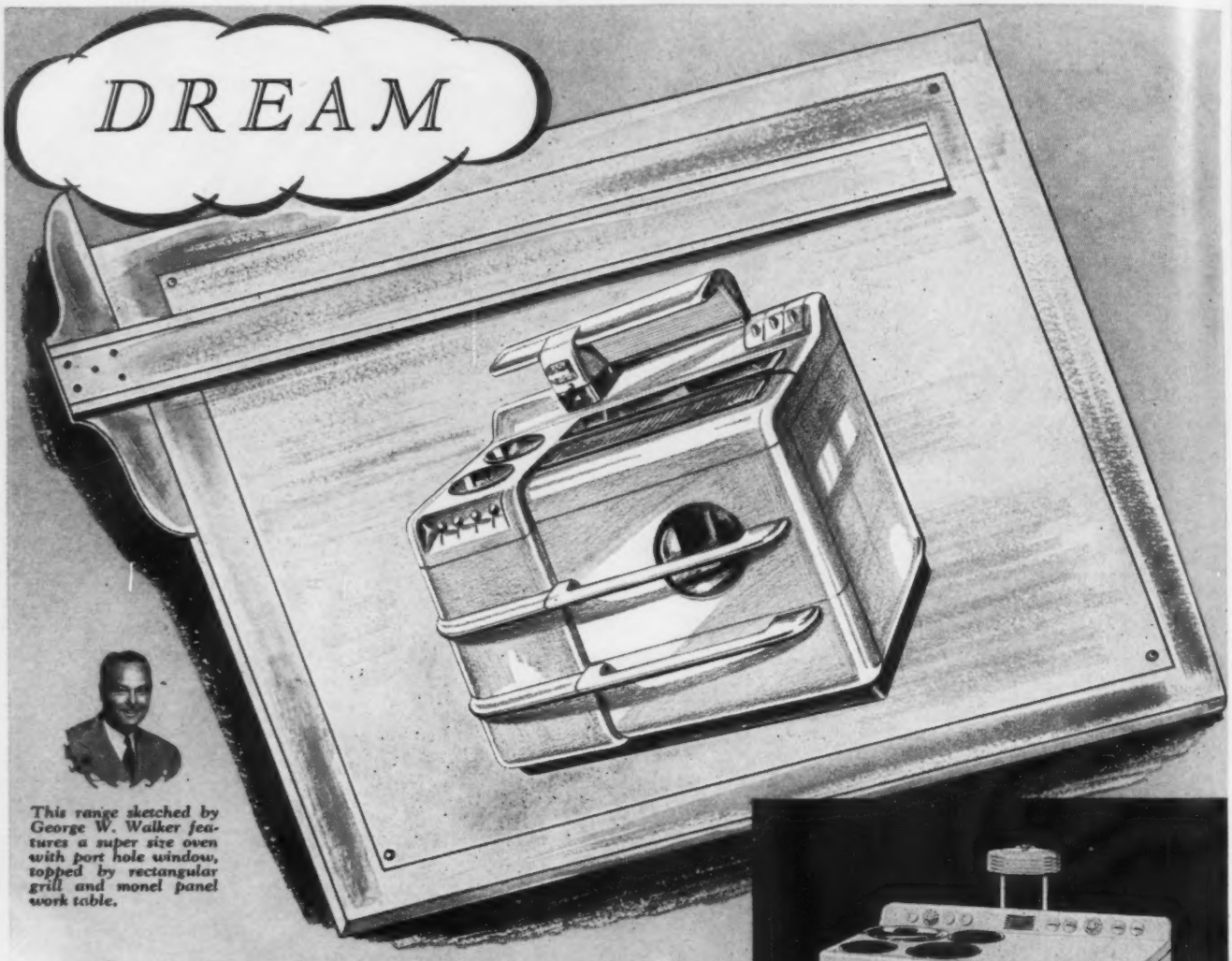
Gentlemen:

I plan to "moderneer" the business operations of my store — please send me complete Systemeering Guide.

Name_____

Address_____

City_____



This range sketched by George W. Walker features a super size oven with port hole window, topped by rectangular grill and monel panel work table.

on a Drawing Board . . .

A smart-looking helicopter to fly you to work. A compact two-way radio to keep you in touch with home or office. Countless electronic gadgets to save time and effort. These are all dreams for tomorrow.

One dream we know will come true—Electromaster's postwar range, selected by dealers, home economists, and public utility officials from a number of exclusive new designs created by George W. Walker. Walker has achieved nation-wide recognition as the creator of more than two thousand products in everyday use.

This new Electromaster range will be up-to-the-minute in electric cooking comfort, economy, and efficiency. Straight line production will assure the same trouble-free service that Model 15-1 (shown at right) is now providing in thousands of kitchens. This model, with storage drawers on ball bearings, twin unit illuminated oven, master signal light, 6 quart Vita-Miser cooker, warmer oven, and interval timer, was one of the most popular of the prewar line.

Dealerships are still available in some territories.

Electromaster

1803 EAST ATWATER STREET DETROIT 31, MICHIGAN

THE FORMULA HAS TO BE RIGHT FOR A LONG, USEFUL LIFE

Only patient, scientific research could have produced a rubber formula combining all the desirable characteristics of Nubun—U.S. Rubber Company's new insulation for wiring.

Extremely tough as well as flexible, this buna compound assures longer life for the wires and cables used in the coming era of intensified electrification. The high dielectric strength of Nubun permits reduction of over-all diameters . . . without endangering circuit integrity . . . allows more wires to be encased in a single conduit.

Nubun will be used in innumerable ways . . . for building and industrial wiring, for control and signal systems and for communication services. Nubun is young . . . but Nubun is headed for a bright future in electricity.

Serving Through Science

UNITED STATES RUBBER COMPANY

123 SIXTH AVENUE • ROCKEFELLER CENTER • NEW YORK 20, N. Y.

BIG NEWS

T-K REPLACEMENT UNITS

AVAILABLE NOW

TO FIT ANY MAKE ELECTRIC RANGE

Here's news that will bring smiles of happiness to Housewives who own Electric Ranges. Now—Mr. Dealer, you can replace every burned out unit with the famous T-K replacement unit assuring long life, economy and trouble proof operation.

THE FUTURE'S BRIGHT FOR T-K DEALERS

Get on the T-K bandwagon now. Stock T-K products—sell quality—make loyal friends. Your T-K distributor will help you.

MAIL COUPON NOW FOR NAME OF YOUR NEAREST DISTRIBUTOR

TUTTLE & KIFT INC.

1825 North Monitor Avenue • Chicago 39, Illinois

Gentlemen: Please send me name and address of nearest T-K distributor. No obligation.

☐ Please send Catalog and Service Manual No. 8

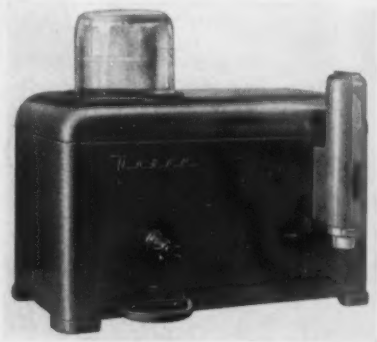
FIRM NAME_____

ADDRESS_____ CITY_____

Appliance Line (912)

Norge has announced three additions to its home appliance line—a portable water cooler, a home and farm freezer and an automatic cycle washer.

The water cooler was designed for use in offices, homes, hospitals, clubs, etc. It has a capacity of 1½ gal., which can be cooled in one hour; power is from a 1/12-hp. hermetically-sealed "rollator" motor. Dimensions are 22 in. wide, 13 in. high and 12 in. deep and, according to the manufacturer, it



can be carried easily by the average individual. The water compartment is styled to hold a one-gallon bottle or can be filled from a pitcher. Five-gallon bottles may be used, if desired. A cup dispenser is attached to the cabinet front.

The freezer will be offered initially in four sizes, three for the city or suburban home primarily, the fourth for the farm. Capacities will be 6, 11, 18½ and 26 cu. ft. Construction will be of the chest, lift-lid type and exteriors will be white.

Power for the 6-cu. ft. model will be from a 1/6-hp. hermetic motor-compressor unit. This model has a single compartment and is intended primarily for food storage, although it is claimed that it will freeze foods satisfactorily. The 11-cu. ft. cabinet, powered by a ¼-hp. motor-compressor, has a large storage space with a separate freezing section. Compartments have individual lift lids equipped with a locking device. The 18½-cu. ft. size will hold more than 500 lb. of frozen food, according to the manufacturer, and will have two large storage compartments and a separate freezing space, each covered by a locking lift lid. Power will be from a 1/3-hp. unit. This freezer will be small enough to be carried through a 30-in. door, it is stated. The 26-cu. ft. freezer will have a ½-hp. heavy-duty motor unit and will be a three-lid, three-compartment model providing 20½ ft. of space for storing and 5½ ft. for freezing.

Details on the washer were not given in the initial announcement beyond the statement that it would be fully automatic and have standard exterior dimensions.

Freezer Cabinet (913)

Weber Showcase & Fixture Co. has announced that it will manufacture a Roll-A-Door model household frozen food cabinet. On the household cabinet, rollers used on commercial equipment, will be replaced by sliding doors. Household models will be approximately 4½- and 7-cu. ft. capacity.

Cleaner (914)

Hoover has announced production on a limited basis of its Model 27 cleaner which was being manufactured but had not been marketed prior to April 1942. This design incorporates the side plug for attachments, formerly offered on higher priced models.

COLLYER Service Entrance Cable Type SE (Style U) defies the elements . . . resists snow and rain, wintry blasts and baking sun . . . offers maximum economy and freedom from trouble. Inner conductors are tinned copper; insulation is high grade synthetic rubber, covered with tape of rubber filled construction. The bare ground wire of soft tinned copper is wound concentrically and protected by a double wrap of rubber filled tape. Overall is a rugged braid covering, well saturated and smoothly finished in gray paint. Available in two and three conductor, sizes 2 to 12; also in armored construction, Underwriters Type SE (Style A). Write for further information.

Collyer
INSULATED WIRE CO.
ALLIED INDUSTRIES INC.
Los Angeles • San Francisco • Seattle

THE LAMPS ARE

...the results are better

Eyes like these must be sure. And they are sure—without strain or fatigue—because See-ability makes every adjustment clear and sharp, helps maintain high speed efficiency.

Draughting is an art that reaches its peak only under the finest lighting conditions. Westinghouse Fluorescent Lamps provide the See-ability that work like this demands.

A misplaced wire—a wrong connection and—somewhere a costly error. Accuracy that prevents errors must have the See-ability of Westinghouse Fluorescent Lamps.

© 1945 Westinghouse Electric Corporation

WESTINGHOUSE

See-ability

Today—in every branch of industry—Westinghouse Fluorescent Lamps are meeting industry's lighting needs—are providing invaluable aid to every seeing task where speed and precision are prime production factors. Alert dealers are building prestige and profits on the firm foundation of an adequate supply of these dependable lamps.

Throughout industry—wherever you go—industry is demanding top grade lighting. Sell Westinghouse Fluorescent Lamps and meet this demand —completely!

Office workers respond to the better See-ability of Westinghouse Fluorescent Lamps. More contentment —more speed—fewer mistakes when the lighting problem is solved.

Westinghouse

PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE

MAZDA LAMPS FOR SEE-ABILITY

A Tribute

to all those who helped in the greatest scientific achievement of all time... the

ATOMIC BOMB

"TO KEEP THE PEACE"

For the inspiration and leadership displayed by the Executive, Military, and Naval authorities... to the Scientists... Engineers... to Labor, and to those Companies that played a part in this unprecedented achievement, General Cable voices the sentiment of America in extending highest praise and heart-felt appreciation. Because of their scientific genius, their untiring effort and their complete devotion to this gigantic task, Victory comes sooner and all mankind benefits.

General Cable Corporation is also justly proud of the contribution made by its own staff in the engineering development and manufacture of still secret and exceedingly special materials essential in the production of this device of war... and of Peace.

GENERAL CABLE CORPORATION

MANUFACTURERS OF BARE AND INSULATED WIRES AND CABLES FOR EVERY ELECTRICAL PURPOSE

CHECK the FACTS

1. Be positive — know for sure whether circuits are "live" or "dead".
2. Visible indication (glow from neon tube)—no guesswork.
3. Light, easy to handle indoors or out, on apparatus or conductor.
4. Use on 2200 Volt circuits (line to ground) and above, 25 cycle and above.

No auxiliary equipment required — only one exposed electrode to contact apparatus. No connections to ground.

Get your copy of the Descriptive Bulletin

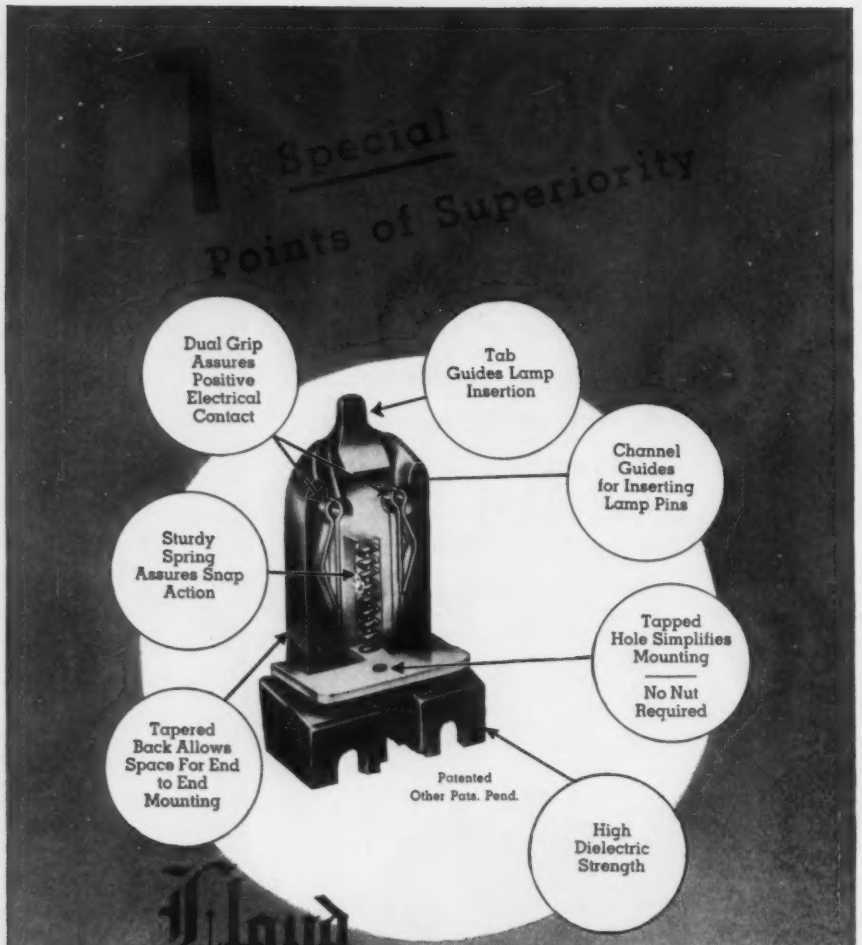
R&IE LIVE LINE TESTER

The Check List

- CONDUCTOR SUPPORTS, CLAMPS AND FITTINGS
- DISCONNECTING SWITCHES INDOOR AND OUTDOOR
- AIR BREAK SWITCHES
- INTERRUPTER SWITCHES
- CUTOUTS AND THERMO-RUPTERS
- SWITCH OPERATING MECHANISMS
- TATIONS
- OPEN OR ENCLOSED, ISOLATED PHASE HEAVY DUTY BUSES
- KIRK INTERLOCK SYSTEMS
- AUTOMATIC SECTIONALIZING EQUIPMENT
- METAL CUBICLES
- TESTING DEVICES

GARLAND-AFFOLTER ENGINEERING CORP.

SAN FRANCISCO • LOS ANGELES • PORTLAND • SEATTLE


Special
Points of Superiority
Dual Grip Assures Positive Electrical Contact
Tab Guides Lamp Insertion
Channel Guides for Inserting Lamp Pins
Sturdy Spring Assures Snap Action
Tapped Hole Simplifies Mounting
No Nut Required
Tapered Back Allows Space For End to End Mounting
Patented
Other Pats. Pend.
High Dielectric Strength

Lloyd

FLEX-LOC

Lamp Holder

FLEXIBLE—Automatic—self adjusting to variations in lengths of lamps and spacing dimensions in fixtures.

AUTOMATIC LOCK AND CONTACT is positive. Stands all shocks. Lamp cannot fall out.

INSERTING LAMP: Place lamp pins on both sides of lamp holder guiding tab. Push lamp up slightly and pins will slide into channels. As pins slide up to terminal holes, the holder is flexed outward, compressing the spring. As lamp pins enter holes, the holder snaps inward, with spring returning to normal.

TO REMOVE LAMP: Take hold of lamp with one hand. With other, press guiding tab of nearest lamp holder outward and the lamp will disengage itself.

LLOYD AUTOMATIC STARTER

IN THE NEW RED PLASTIC CAN

Stronger—Higher Dielectric Strength

When lamp becomes inefficient . . . flickers or blinks, Lloyd Automatic cuts off the current automatically . . . starts the new lamp when inserted, automatically.

Prevents overheating of ballast. Saves maintenance and power costs.

Listed and Approved by Underwriters' Laboratory Inc.

Certified by Electrical Testing Lab. Spec. 6.

Pat. Nos. 2200443 2228210

LLOYD PRODUCTS CO.

LLOYD POLICY INSURES QUALITY

Providence 5, Rhode Island

Representatives — Branch Offices — Warehouse Stocks in 23 Leading Cities

Lampholders (915)

Lampholders for slimline and circline fluorescent lamps have been announced by General Electric, with the slimline holder designed for use in general lighting fixtures and the circline for fixtures and portable lamps in commercial and industrial installations.

Slimline lampholders are of the medium, single-pin type for multiple service only, and accommodate the T8 and T6 lamps. They can be mounted to any flat surface and spaced on 2-in. centers minimum. Binding screws are in the base. Two make up a pair for one lamp.

The circline lampholder provides electrical connections, positions the lamp and supports it at two points. One point has the electrical connections and the other gives the necessary tension to hold the lamp securely.

Shock-Resistant Lamp (916)

A high-impact filament lamp, equipped with a rubber cushion base, was developed by General Electric to withstand shocks of naval warfare. Although in service since early in the war, its development was not announced until recently. This lamp, rated at 50 watts, resembles the ordinary household lamp except for a thick band of rubber surrounding the neck. This rubber skirted insert is firmly located between the lamp's medium screw brass base and the glass neck. Postwar uses are seen for industries or equipment which would subject lamps to violent physical shock.

Floodlight (917)

Goodrich Electric Co. is making a long-range floodlight, incorporating a bracket mounting which provides calibrated adjustments for positioning vertically and laterally. According to the announcement, when this reflector is serviced, it is tipped upwards and back, permitting work from behind on cross arm or platform. When lamp has been replaced, the floodlight is returned to the exact calibrated setting. It is available in open style or with watertight, heat-resistant glass lens.

Lamp for High Humidity (918)

Sylvania has announced a new instant-start 40-watt T-12 fluorescent lamp, which is specially treated for operation under high humidity conditions. The lamps are said to operate in two-lamp compensated ballast circuits, 450 volts, without affecting light output, life or other features of standard 40-watt fluorescent lamps. They are not interchangeable with standard 40-watt lamps but have the same ratings.

Hoist Drive (919)

General Electric has a new hoist drive for cranes, which is said to automatically measure the load so that it is hoisted and lowered at the maximum safe speed. This drive has a specially constructed cross-flux exciter and is for use on either indoor overhead slow-speed cranes or high-speed cranes of the type used in outdoor construction. It is available for a-c or d-c operation.

A COMPACT, INSULATED MULTIPLE CONNECTOR FOR UNDERGROUND SYSTEMS

BURNDY HyCrab

Here is a crab joint for connecting your underground cables that is easy to rack, takes up little room in the manhole and is *economical*. Cable connections are quickly made. Simply roll back insulation, insert cable, indent with Burndy Hypress, roll down insulation to its original position and tape.

Standard HYCRABS are available with from 3 to 8 outlets, and for cable sizes of from 4/0 Str. to 500 Mcm. Reducing adapters permit the installation of smaller cable. The HYCRAB comes to you with two outlets ready for immediate use, while all others are sealed with vulcanized rubber plugs.

Burndy makes a complete line of underground network connectors and limiters, including the well-known MOLE and MOLIMITER. In solving your underground distribution connection problems, you can depend on Burndy's "know-how". Write for the "Burndy Electrical Network Equipment" catalog, (Bulletin No. 6001). Burndy Engineering Co., Inc., 107-V Bruckner Boulevard, New York 54, N. Y.

Other Burndy Underground Equipment

LIMITER, type YFS—furnished with or without insulating sleeve. Also available in replaceable link types.

LIMITER LUGS, type YFA — combining the functions of limiter and terminal, furnished with or without insulating sleeve.

LIMITER TAP, type YVFT — for making cable connections through limiter to cable ring bus. Completely insulated.

HYPRESS, type Y34A — portable hydraulic press for installing cables, up to 500 Mcm, to Hycrabs, limiters, lugs, taps, etc. Other types available for all cable sizes.

Headquarters for CONNECTORS

Burndy

Certified
FLEUR-O-LIER
CERTIFIED
in accordance
with Test
Requirements of
Specifications of
Fleur-O-Lier Manufacturers
CERTIFIED
ETL
ELECTRICAL TESTING
LABORATORIES, INC.
NEW YORK, N. Y.
Certifying Agent
...you
* Certified Ballasts and
Starters are an important part
of Fleur-O-Lier Certification.

WHEN FIXTURES WEAR THIS LABEL

have lots of extra selling punch

For you can be sure that fixtures labelled Fleur-O-Lier are RIGHT! You can be sure of performance. You can count on trouble-free operation. And your customers know it!

Here's why:

1. Fleur-O-Lier certification is a protective service set up to help you and your customers. Over 30 leading fixture makers build fixtures that carry it. That means many sources of supply.

2. This label on a fixture means that it is built to definite authoritative specifications . . . to provide the best in lighting and lamp performance, together with dependable service.

3. It signifies that fixtures are subject to rigid test by Electrical Testing Laboratories, Inc., and are certified by them as meeting Fleur-O-Lier specifications.*

4. It brings you the knowledge and research of many of the finest technicians in fluorescent lighting.

And in addition—this label lets you choose from a wide variety of fluorescent fixtures designed to appeal to the taste and style needs of your customers—and be sure about quality!

So when you're planning for tomorrow's fluorescent lighting sales, be sure fixtures marked Certified Fleur-O-Lier are part of your plans.

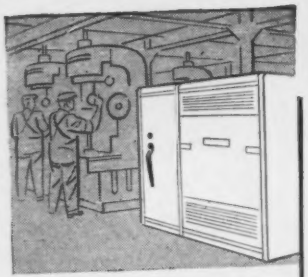
FLEUR-O-LIER

Manufacturers

CERTIFIED FIXTURES FOR FLUORESCENT LIGHTING

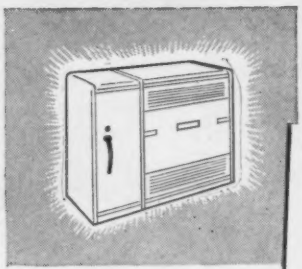
Participation in the FLEUR-O-LIER MANUFACTURERS' program is open to any manufacturer who complies with FLEUR-O-LIER requirements

4 reasons why AIR is today's best insulating medium for indoor transformers



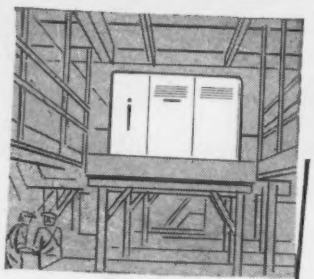
1. SAFER

Air cooling eliminates fire and explosive hazards. No inflammable liquids—no internal gas pressures, because no sealed tank is needed.



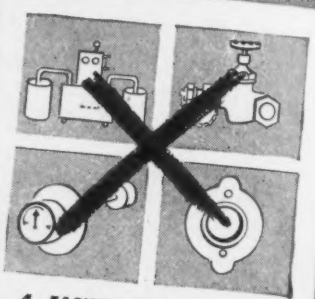
2. CLEANER

Air cooling does away with liquid seepages and liquid reconditioning. Coils easily cleaned with compressed air when used in very dirty atmosphere.



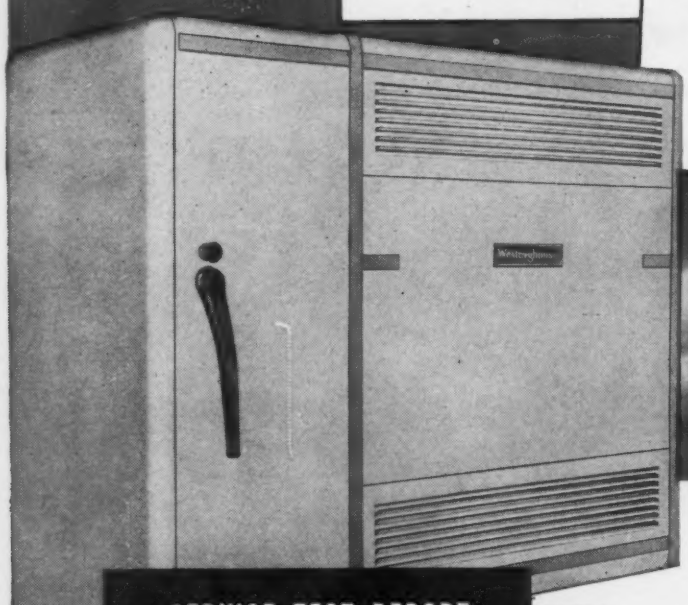
3. EASIER TO INSTALL

Air-Cooled Transformers need no vaults, catch basins or relief vents. Install them anywhere —on the floor or overhead.



4. EASIER TO MAINTAIN

No time out for liquid inspection, filtering or reconditioning —no pipes, fittings, valves or gaskets to maintain with Air-Cooled Transformers.



SERVICE TEST REPORT

WITHSTANDS 95% HUMIDITY

In the tropics, a Westinghouse 150 kva Air-Cooled Transformer has been operating continuously for two years in an atmosphere that remains constantly between 95% and 98% humidity. Transformer is loaded 6 days a week and remains energized over the week end. Condensation conditions are severe, but to date, there have been no indications of insulation deterioration.

Since 1936 the trend of transformer design for indoor applications has been towards AIR COOLING. Four important reasons why are shown here.

Westinghouse Air-Cooled Transformers and Power Centers are in service today in all types of industrial plants, under widely varying extremes of conditions, in all climates from subarctic to the tropics. Their service records are major reasons for today's acceptance and demand for air cooling in indoor transformer installations. For details, write for booklet B-3459, "Air Cooling". Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa. J-70451

Westinghouse *Air Cooled* TRANSFORMERS

Why you get Maximum Horsepower with PELTON Hydraulic Turbines

Buckets with central dividing splitters—the original discovery of Pelton—develop more horsepower from a given quantity of water. More horsepower spins larger electric generators and produces lower-cost kilowatts.

All through the 65 years of peace and war since this Pelton discovery, electric companies have relied upon Pelton Turbines and water-control equipment for utmost efficiency and reliability.

Constant Pelton research and improvements set today's standards for impulse turbines throughout the world.

PELTON Impulse Turbines are made from a fractional horsepower to 70,000 horsepower and more. Pelton Reaction Turbines are also made in a wide range of sizes including 55,000 horsepower and more. They are likewise used in gigantic electric power projects.

Such hydraulic turbines, together with huge water-discharge valves and pressure-regulating devices to control turbines, demonstrate the engineering achievements and manufacturing facilities of the Pelton Water Wheel Company.

BLW THE BALDWIN GROUP

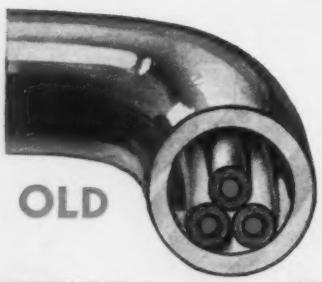
The PELTON WATER WHEEL Company

A Subsidiary of the Baldwin Locomotive Works

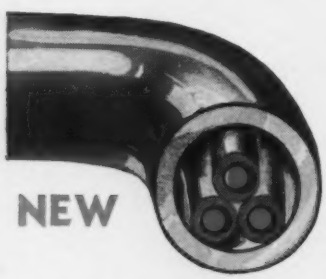
2929 NINETEENTH STREET SAN FRANCISCO 10, CALIF.

• RUBBER POWER CABLES • VARNISHED CAMBRIC CABLES • BUILDING WIRE • SERVICE ENTRANCE CABLE • CRESFLEX NON-METALLIC SHEATHED CABLE • ARMORED CABLE •

See How
CRESCENT SYNTHOL TYPE T



3 No. 12 Type R Carry 20 Amps.



3 No. 8 Type T Carry 41 Amps.

Permits DOUBLE THE AMOUNT OF COPPER *in Existing Raceways*

Illustration shows ½" conduit

Under present conditions there is urgent need for an economical and quick way of adding to the current carrying capacity of branch circuit conduits already installed. Increasing numbers of electrical appliances, air conditioning units and other equipment call for greater load on these branch circuits.

A simple solution to this problem is to replace present wiring with CRESCENT SYNTHOL Type T (formerly Type SN), which offers an easy and low-cost way approximately to double the current carrying capacity of the existing raceway.

An even greater increase in carrying capacity can be secured by wiring with CRESCENT Type TW in place of lead covered cable in wet locations.

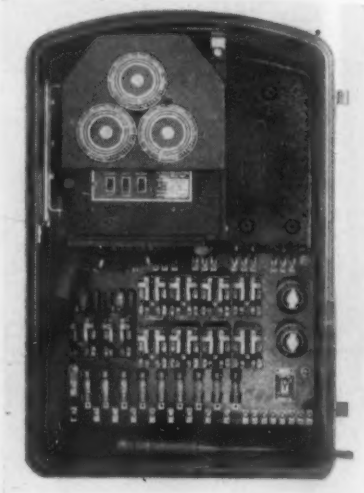
Write for Descriptive Folder on SYNTHOL Type T and Type TW

CRESCENT INSULATED WIRE & CABLE CO.
TRENTON, N. J.

CRESCENT
WIRE AND CABLE

• PERMACORD • LEAD-ENCASED AND PARKWAY CABLES • SYNTHOL WIRES • WELDING CABLES • SHIPBOARD CABLES • IMPERIAL NEOPRENE JACKETED PORTABLE CABLES •

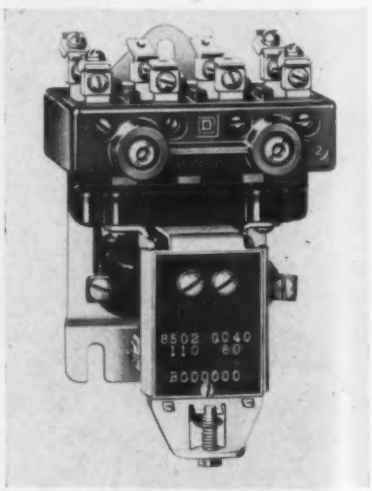
Traffic Controller (920)



Permitting automatic change of signal interval lengths to correspond with changes in the volume of traffic, a multi-dial traffic controller has been designed by General Electric Co. This controller is available with two or three dials and comes in two types, one for isolated intersections and one for use with single or other multi-dial controllers in an interconnected system. Each dial is preset for a different traffic condition, and a time switch automatically brings the correct dial into operation as required. A manual switch is provided for operation of any of the dials when an unexpected traffic change occurs. In an interconnected system, the device can be used with triple reset and remote cycle change, regardless of which dial is operating.

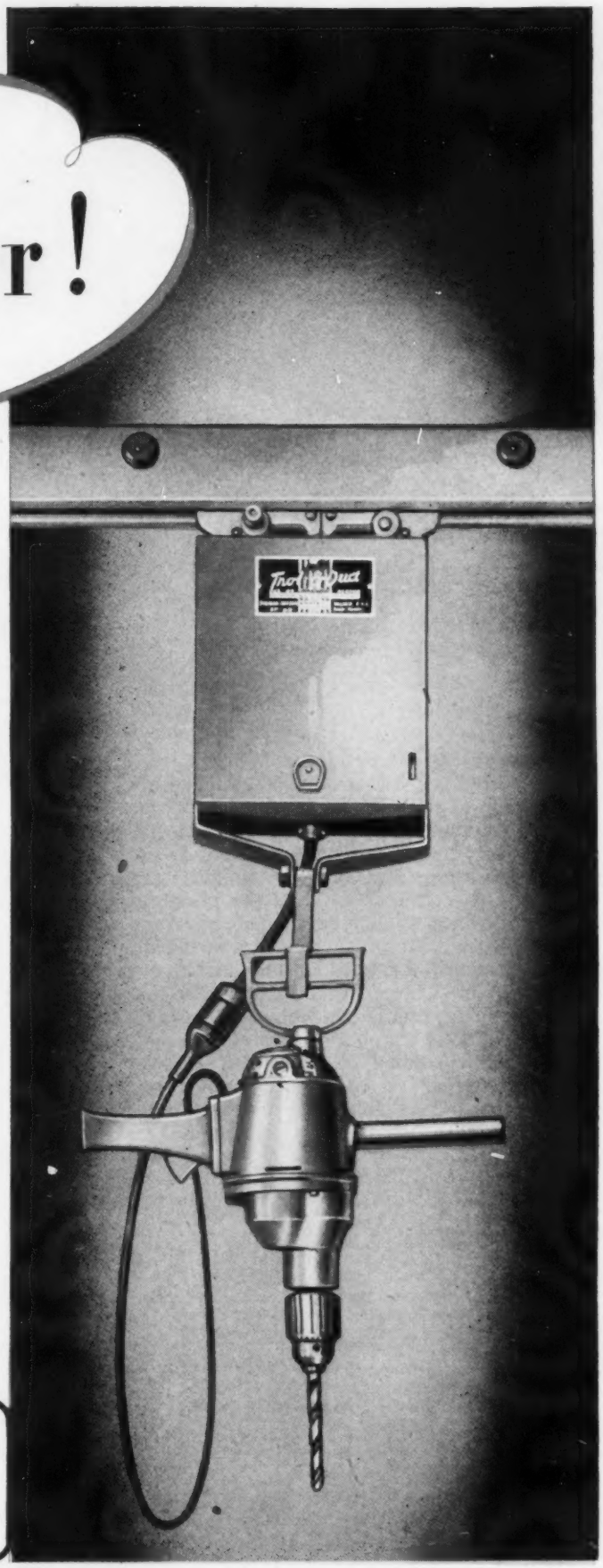
Contactor (921)

A new size 00 contactor, featuring convertible contacts, has been announced by Square D. Conversion from normally open to normally closed is effected by removing a movable contact assembly, inverting it and putting it back in place. All terminals have



provision for two wiring clips, according to the announcement, and a new type contact bar and guide have been designed. These contactors are available with two to six poles in any combination of normally open and normally closed contacts. Ratings are 600 volts a-c maximum; 10 amp. open, 9 amp. closed.

Pacemaker!



BULLDOG INDUSTRIAL TROL-E-DUCT

Moves the Power with the Load

When power is needed for portable tools, it's there — right overhead. And it moves right along with the job.

BullDog Industrial Trol-E-Duct saves you money — does away with expensive installations of fixed wiring and the dangers of long, trailing cables. Completely enclosed, it guards your workers against accidental contact with "live" parts.

This safety feature also makes it an ideal electric feeder for Cranes and Hoists.

Industrial Trol-E-Duct gives you a flexible system — sections can be added any time you want to expand or change your shop set-up. And the whole system can easily be moved anywhere in your plant. It is 100% salvable, too — nothing to scrap.

Single Phase or Three Phase, AC or DC — 575 Volts or Less.

For nearly half a century, we have been "pacemakers" in electrical distribution systems. We invite you to consult expert BullDog field engineers about the power problems in your plant. Or write us for descriptive folders.

BUY WAR BONDS

BULLDOG

ELECTRIC PRODUCTS COMPANY

Box 177, R. Pk. Annex
Detroit 32, Michigan

Field Engineering Offices in All Principal Cities.

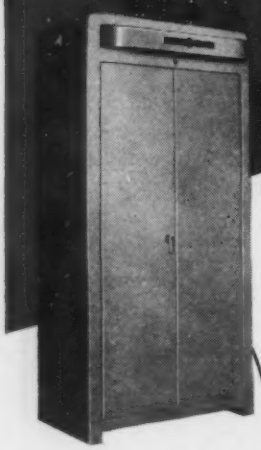
BULLDOG PRODUCTS ARE SOLD AND DISTRIBUTED BY THE FOLLOWING PACIFIC COAST REPRESENTATIVES:

Coast Electric & Manufacturing Co.
1720 N.E. Sixth Avenue
Portland, Oregon, Tel. Garfield 2844

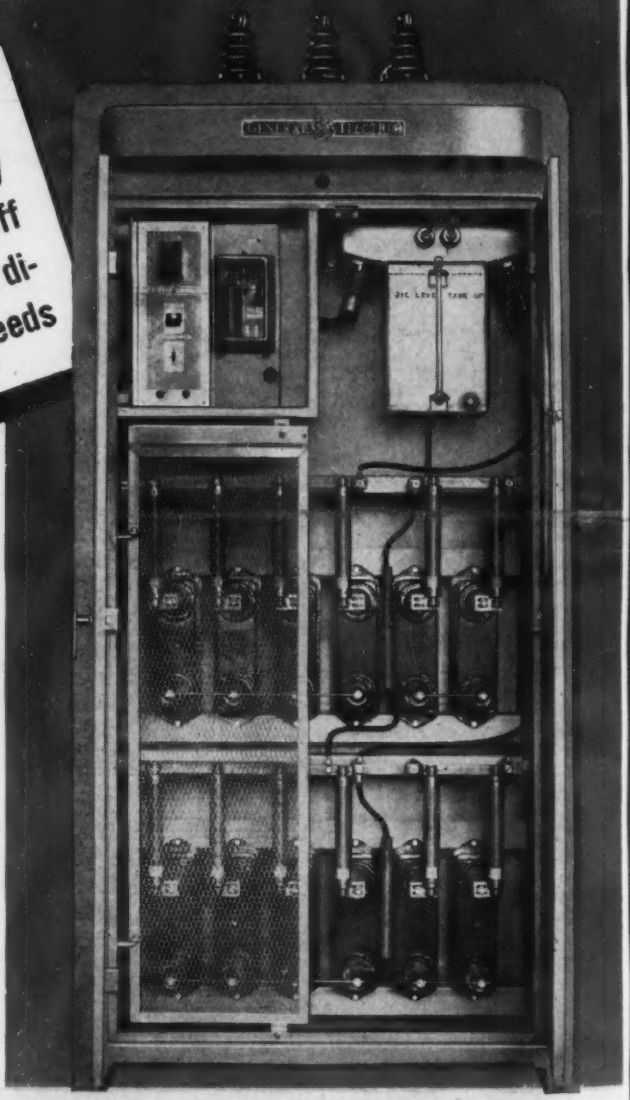
Safety Switchboard & Manufacturing Co.
1445 Stevenson St.
San Francisco, Calif., Tel. Hemlock 2470

Mullenbach Electrical Manufacturing Co.
2300 East 27th Street
Los Angeles, Calif., Tel. Jefferson 2224

For KILOVARS during peak loads without overvoltage at light loads



NEW G-E AUTO-SWITCH CAPACITOR automatically switches 180 kvar on and off 2400/4160 Y-volt circuits in direct response to circuit needs

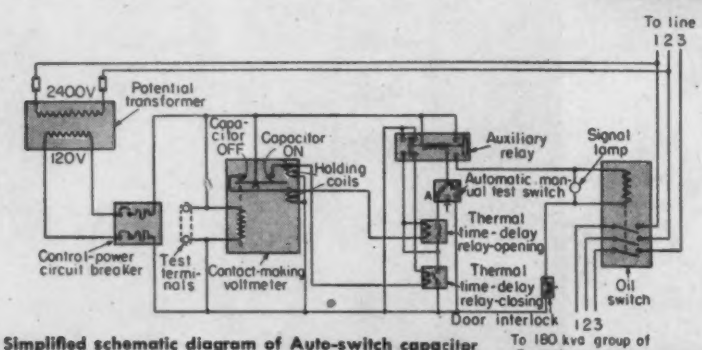


• Capacitors permanently connected to the circuit can be augmented, at periods of peak loads, without causing overvoltage at light loads, by the use of the new G-E Auto-switch capacitor. This capacitor is *automatically* connected in the circuit when increased load causes a drop in voltage, and is *automatically* disconnected when the load decreases. Thus the possibility of premature burnouts of such equipment as lamps and solenoids on your customers' circuits is reduced.

It is designed for outdoor use, either foundation-, platform-, or crossarm-mounted. The attractively styled housing has a durable, light-gray, weather-resistant finish. A number of special features contribute to safety, accessibility, and ease of installation.

Voltage-responsive Auto-switch capacitors are available for use on 2400-volt delta and 4160-volt, 4-wire or Gr Y systems. Current-responsive models can also be obtained.

Ask for Bulletin GEA-4405 for complete information.
General Electric Company, Schenectady 5, N. Y.

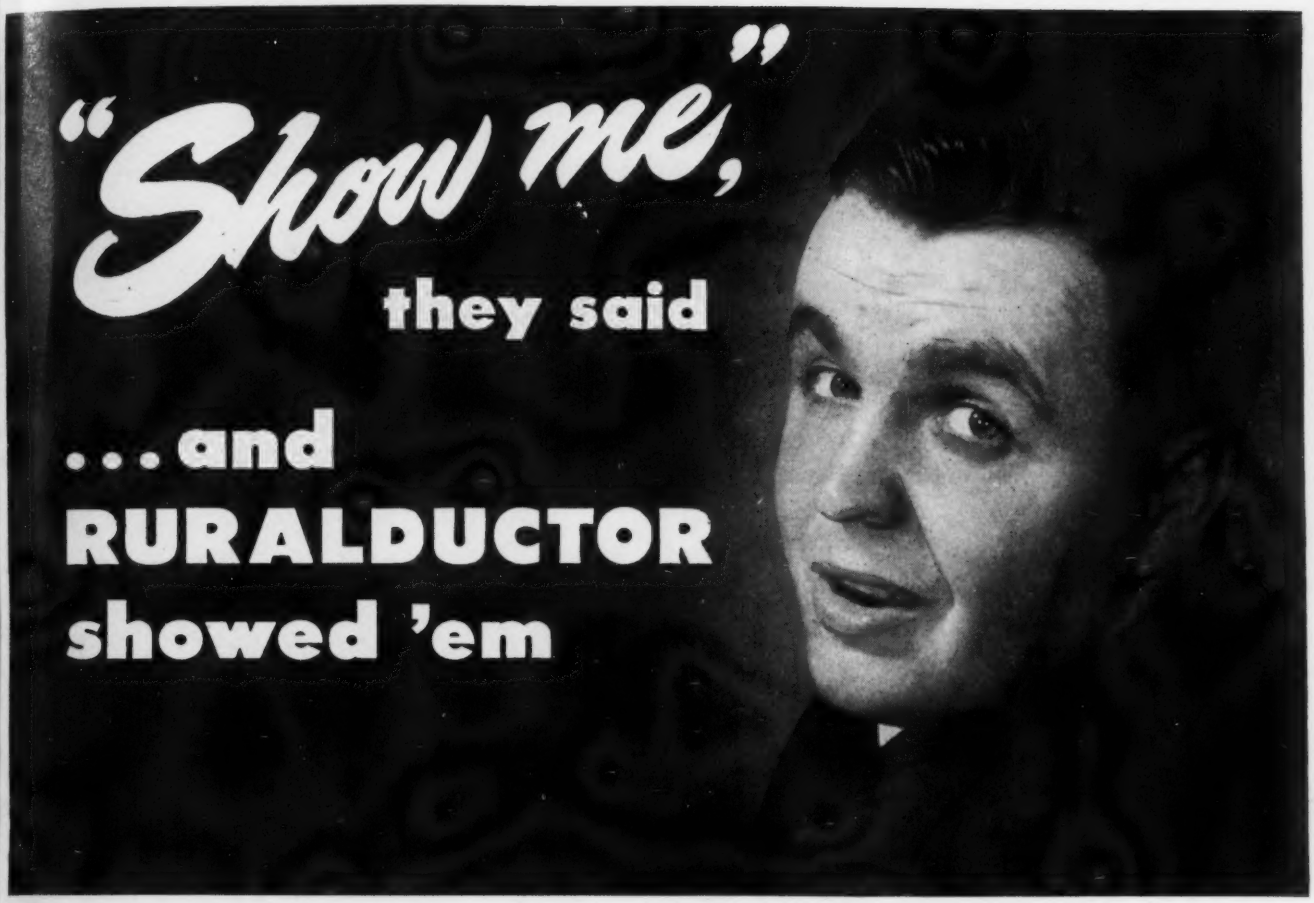


Simplified schematic diagram of Auto-switch capacitor

PYRANOL CAPACITORS

Buy all the BONDS you can—
and keep all you buy

GENERAL ELECTRIC



When Ruralductor first made its bow several years ago, it was greeted by an understandable "show me" attitude. Electrical engineers, long accustomed to non-ferrous materials, wanted more than talk. They wanted to *see* what a steel conductor would do.

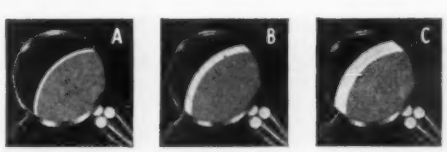
Ruralductor showed them, one by one—showed them so well that many miles of this stranded steel conductor are now installed in America's rural districts.

To the more recent users, those who have put in Ruralductor during the past 12 months, we offer a suggestion: make a thorough check—*now*—on your Ruralductor installations.

You'll find, we believe, that line losses have not been excessive; that Ruralductor has done what we said it would do when used as recommended. That its strength has made possible longer spans—hence a reduction in the number of pole structures needed.

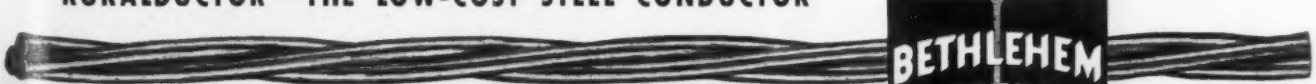
Granted, Ruralductor has lower electrical capacity than non-ferrous conductors. BUT—where tap mileage and secondary feeders predominate, Ruralductor has proved itself entirely adequate. For that reason, its use will mean welcome savings in most of the rural areas still to be served.

We will gladly furnish full details to any company that is not yet acquainted with the advantages of Ruralductor.



A bethanized coating, available in A, B, and C weights, covers each of Ruralductor's wires. Applied electrolytically, this ductile zinc armor guards against rust. Since the coating is made in three weights (to combat different corrosive exposures), you can select the one best suited to your locality. Thus, in practically any rural section of the country, Ruralductor is adequately protected throughout the life of the installation.

RURALDUCTOR—THE LOW-COST STEEL CONDUCTOR



BETHLEHEM STEEL

BETHLEHEM STEEL COMPANY—on the PACIFIC COAST—*District Offices:* San Francisco, Los Angeles, Portland, Seattle; *Steel Plants:* South San Francisco, Los Angeles, Seattle; *Fabricating Works:* South San Francisco, Alameda, Los Angeles; *Shipyards:* San Francisco, Alameda, San Pedro.

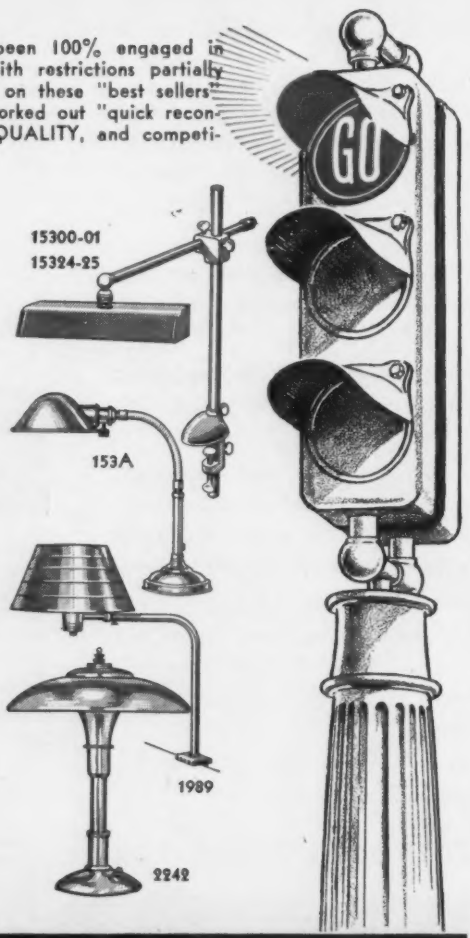
Pioneers in
LIGHTING EQUIPMENT
Since 1880

Faries

The Green Light Says GO!

WE'RE READY...
with over 60 of the fastest-selling pre-war Lamps and Fixtures

Until now, our facilities have been 100% engaged in vital war production. NOW, with restrictions partially lifted, we're starting production on these "best sellers" in accordance with a carefully worked out "quick reconversion" plan. They're FARIES QUALITY, and competitively priced.



DESK LAMPS, FLOOR LAMPS and INDUSTRIAL BRACKETS

The items shown, as well as many others displayed in the Flyer Catalog, will be available just as soon as raw materials are obtainable . . . some numbers before others. No preference rating of any kind is necessary, altho, under the regulations, rated orders must be shipped first. Get your orders in now to be assured of early delivery from our first production run.

Write For New Flyer Catalog
. . . just off the press . . . illustrating the 60-odd "best selling" numbers that are available NOW.

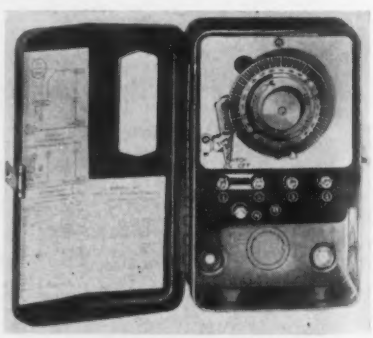
New Flyer Catalog

FARIES MFG. CO. DECATUR ILLINOIS

Immersion Heater (922)

Edwin L. Wiegand has a new Chromalox electric immersion heater designed for melting solid oil, greases and similar compounds in standard 55-gal. drums. In operation, the heater is allowed to melt its way down through the contents. Heating elements are steel sheathed and form almost a complete circle around a tubular unit located in the center, thus eliminating cold areas. Steel braces are welded to the steel riser through which the electrical connections are brought out to the conduit box. The heater can be controlled by a three-heat switch or thermostat mounted direct to the terminal box. Available for 115- or 230-volt, single-phase current in ratings up to 4,400 watts.

Time Switch (923)



Paragon Electric Co. has announced an improved 300 Series time switch equipped with a Telechron motor. This motor is an industrial type, self-starting synchronous motor. The 300 Series has switch capacity of 3,000 watts per pole, with skip-trip feature, knockouts on both sides, back and bottom, and two bearing plate construction.

Alarm on Controller (924)

Brown Instrument Co. announces that it has added a safety emergency alarm feature to its line of electronic air-operated controllers. This feature protects process equipment and materials by automatic alarm and provides an on-off control in addition to air control to actuate equipment.

Special formulations FOR SPECIFIC NEEDS!

Fibron

PLASTIC TUBINGS AND TAPE

Users of flexible plastic tubings and tape secure a large increment of efficiency and economy when they specify "Fibron by Irvington." For the product they receive has been especially formulated for their own specific need. Should the *major* requirement be operation at elevated temperatures, a Fibron formulation for exactly that job can be supplied. Likewise for temperatures as low as —70° F; or for services requiring resistance to acids, alkalis, corrosive fumes, and abrasion. In each case the correct Fibron formulation is supplied. Each formulation of course, furnishes the high electrical and mechanical properties essential for efficient, long lasting insulation.

It is this Irvington policy of *"engineering* and *formulating* for specific applications," that accounts for the long service which Fibron plastic products provide . . . as well as for Irvington's continuing leadership in electrical insulation!

Fibron plastic tubings are produced in all standard opaque colors as well as transparent — diameters from .034" to 2" — in coils or cut lengths. Fibron tapes are obtainable in black and clear, in widths ½" to 3", thicknesses .004" to .030" and in convenient length rolls for hand application. Fibron wire markers are available plain or stamped, in inside diameters from .053" to ½".

An outline of *your* special requirements will receive immediate attention. Write Dept. 44.

STANDARD OF THE WORLD
IRVINGTON INSULATOR

IRVINGTON
VARNISH & INSULATOR CO.
Irvington 11, New Jersey, U. S. A.

"LOOK TO IRVINGTON FOR CONTINUED LEADERSHIP IN INSULATION"

Guth ALZAK Aluminum Lighting

T. M. REG. ALCOA

ALZAK (2-40w) FLUOFLECTORS arranged in continuous rows on 9'6" spacings, with 10'0" mounting, produce 32 to 35 Foot-Candles. Guth (2-20w) LOCAL FLUOFLECTORS over certain benches provide 110-125 Foot-Candles. Engineered by Mr. L. D. Lyon, Consumers Power Co., and sold by Electric Wholesale Supply Co., both of Jackson, Michigan.

ALZAK HIGHBAYS in large Pennsylvania warehouse. Spacings are 20'0" by 20'0", with 27'3" mounting-height. Alternate units utilize 400w Mercury-Vapor, and 750w Incandescent to produce 20 Foot-Candles of uniform illumination. Engineered by owner's Electrical Department; sold by Kingsport Electric Co., Kingsport, Tenn.

SUPER-PUNCH "Light-Kick" REFLECTORS

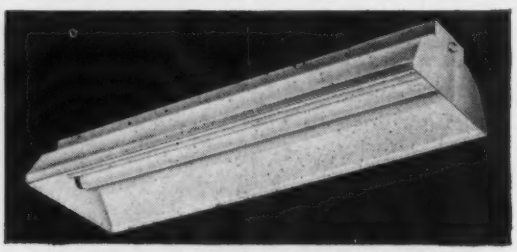
FOR FLUORESCENT AND INCANDESCENT LAMPS

For Light-Control, Efficiency, Punch and Permanence, Guth ALZAK Aluminum reflectors are top-quality. They are processed ALZAK in the Guth Co's. own plant, under quality-controlled supervision.

Engineered reflector contour is omnipotent (where ALZAK reflectors are concerned). Then the Guth ALZAK process electrolytically brightens the formed Aluminum metal for high efficiency; finally, it permanently seals in this efficiency with an aluminum-oxide coating that is *second in hardness only to the diamond!*

Yes, a Guth ALZAK Reflector is a *good, efficient, tough Reflector!*

YORK ALZAK INDIRECTS using 750w, T-24, Bipost lamps on 9'0" by 10'0" spacings, 11'7" ceiling-height, 8'7" mounting-height, provide 50 Foot-Candles of uniform lighting. Complete absence of glare despite horizontal positioning of drafting table tops. Sold by Wipperman-Mitchell Co., Buffalo, N. Y. See I.E.S. Data Sheet 13-19 for further details.



ALZAK FLUOFLECTOR

T. M. REG.

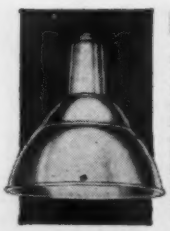
ALZAK reflectors "control" and "direct" the Fluorescent light rays to the *useful* working-plane. FLUOFLECTORS are available in Open-End and Closed-End types. For individual or continuous-row layouts. Sizes are: 2-40, 3-40 and 2-100 watt. Eggcrate Louvres available for added lamp-shielding, where desired.

ALZAK (2-40w) FLUOFLECTORS with Eggcrate Louvres, are arranged in "45° Angle-Spacing" on 6'0" centers, with 9'6" mounting. There are 74 Foot-Candles on the drafting tables (not 1 Foot-Candle variation); the "45° Angle-Spacing" provides "close to shadowless lighting", a remarkable achievement with Direct-Shielded form of lighting. Sold by Eoff Electric Co., Portland, Oregon.

GUTH SURGERY-LITE

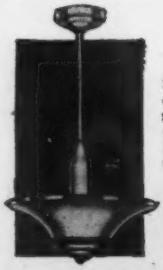
T. M REG.

Spectacular photo above, shows intense light-beam (directed via Guth ALZAK control) piercing a dark haze. Only a small 100-watt Incandescent lamp bulb (1340 Lumens) is used, yet more than 2000 Foot-Candles are developed on the operating table (48" beneath the fixture), with over 1000 Foot-Candles (average) over a 6" circle.



GUTH HIGH-BAYS

ALZAK light-control is the most efficient, least expensive method for effective lighting of high-bay areas (25'0" or higher). Guth lists 3 types (30°, 60°, and 90° beams), and each type in 2 sizes (300-500w and 400w (Mercury) or 750-1500w).



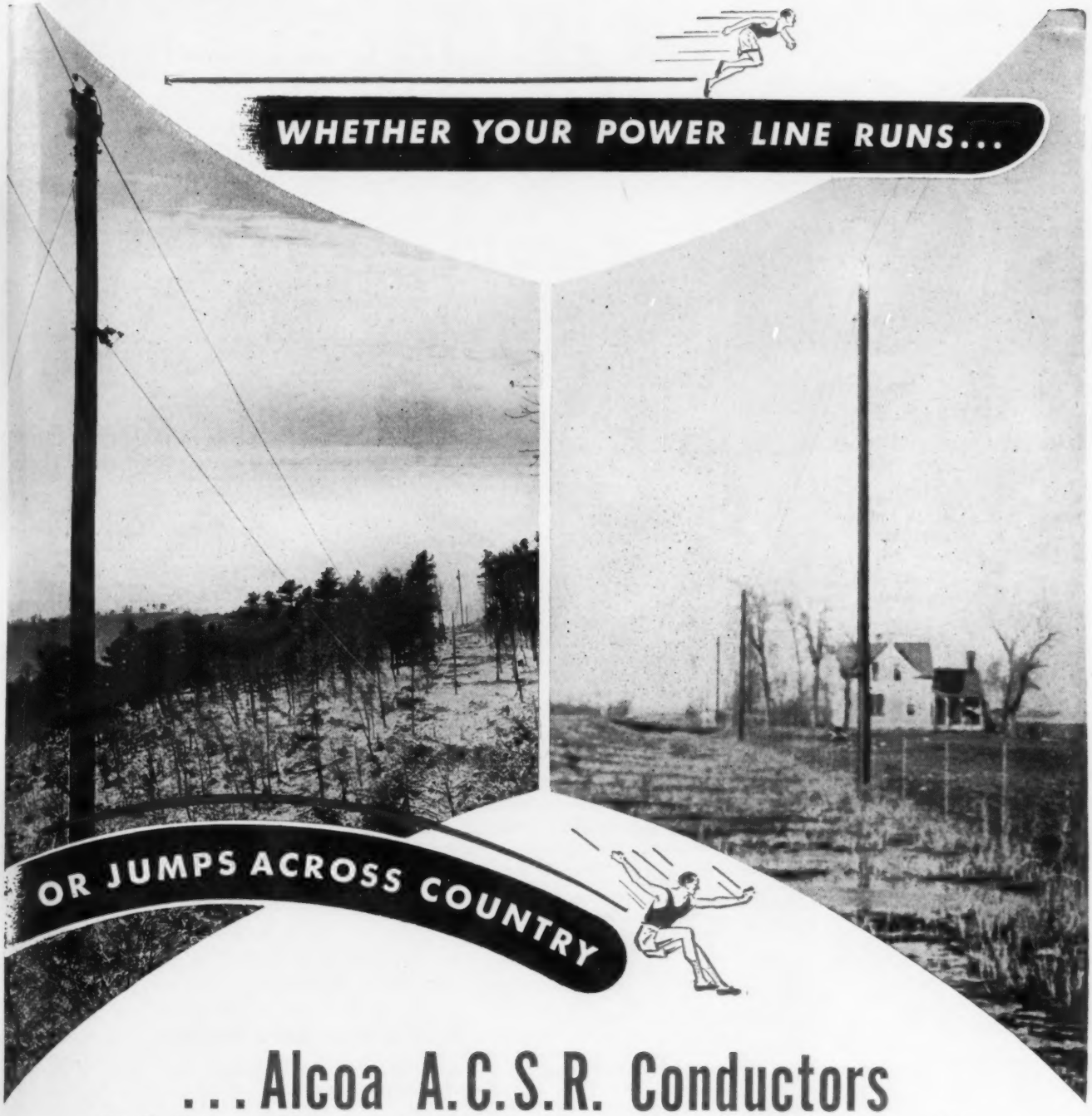
YORK INDIRECTS

Super efficient, nicest looking incandescent-indirect we ever produced. "Light-spill" softly illuminates YORK'S exterior, which blends the luminaire in with the lighted ceiling. Made in 3 sizes, for 200 to 1500 watt lamps.

Leaders in Lighting Since 1902

Guth

THE EDWIN F. GUTH COMPANY • 2615 Washington Ave. • St. Louis 3, Missouri



...Alcoa A.C.S.R. Conductors

Standard span of 300 feet or a long span of 950 or more—engineer and erect your power line according to Alcoa standards and you'll have a line to be proud of. It will be dependable and easy on your pocketbook throughout the years.

Alcoa standards of construction include fittings designed especially for use with A.C.S.R.; armor rods, for example, protect cables at supports. Long spans and flat sags are permissible when A.C.S.R. standards are followed.

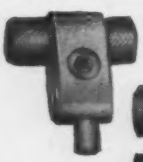
Men with years of operating experience report, "A.C.S.R. power lines cost less to build. And they cost less to operate." ALUMINUM COMPANY OF AMERICA, 2132 Gulf Building, Pittsburgh 19, Pennsylvania.

ALCOA A-C-S-R

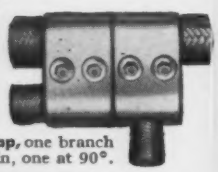
ALUMINUM CABLE STEEL REINFORCED

It's Easy to pick the right CABLE TAP— **from the *Complete* line**

You'll find the widest variety of parallel and 90° taps, combinations, and gutter taps — in a range of sizes up to 1,000,000 cm. Insulating Bakelite covers can be furnished for all types.



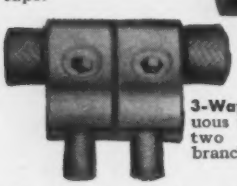
Single 90° Tap from main conductor.



Combination Tap, one branch parallel to main, one at 90°.

Bakelite Covers can be furnished for all types of Penn-Union cable taps.

2-Way Gutter Tap.



3-Way; continuous main and two separate branches.

Also a complete line of Service Connectors, Terminals, Tees, Straight and Parallel Connectors, Grounding Connectors, etc. — every good type of conductor fitting. And every one is accurately made, thoroughly tested — *dependable.*

PENN-UNION ELECTRIC CORPORATION ERIE, PA.

PENN-UNION
Conductor Fittings

BULLETINS

data books, etc.

Control Devices (925)

Wheelco Instruments Co. has prepared three bulletins on its line of electronic control devices: The first describes the company's electronic control principle and four types of control systems; the second, is devoted to the unit construction of the universal type controller; the third describes the Capacitrol, an indicating and control instrument.

Electrical Contacts (926)

Stackpole Carbon Co. is offering a new 36-page catalogue and data book on electrical contacts. All types of Stackpole contact materials are described and data are given on variables in contact selection; factors in the choice of materials; contact types, shapes and sizes; methods of attaching; contact metal compositions; welding and brazing.

Fire Protection (927)

General Detroit Corp. offers a file folder to safety engineers and executives concerned with fire protection. Designed to fit standard file drawers, the folder is printed on the inside with sketches of principal types of fire extinguishers, classes of fire for which each is recommended and other information on operation, recharging and effectiveness.

Television (928)

G-E has published a 16-page bulletin on commercial development of television. Entitled "Intra-Tel Systems", the publication describes a television system for department stores, gives the initial cost and yearly operating expense based on prewar prices. Charts and drawings illustrate the text.

Testing Device (929)

Railway & Industrial Engineering Co. describes its Phasetector testing device in a four-page folder recently issued. The device is used to check circuit phasing and to detect presence of voltage on low-voltage systems from 2,300 volts to 8,000/15,000 Y volts.

Dynamometer (930)

W. C. Dillon & Co., has issued a 20-page booklet on its traction type dynamometer.

Frequency Meters (931)

Various models of vibrating reed frequency meters manufactured by J-B-T Instruments, Inc., are described and illustrated in a four-page bulletin prepared by the company. Included are special purpose meters.

Circuit Breakers (932)

Pacific Electric Mfg. Corp. has a new folder on its circuit breakers, Type JE-30, 23, and 34.5 kv., 600 and 1,200 amp. and Type JE-37, 46 kv., 600 amp. Illustrated with photographs and blueprints.

Lamp Locking Device (933)

Laduby Co. is distributing a circular on its Flur-O-Locks, locking device for fluorescent lamps. They are made in three standard types for all standard fluorescent lamp sockets and for 20- to 100-watt lamps. A sample is included with the circular.

Television as a Career (934)

General Electric has a four-page pamphlet, "Television as a Career", by James D. McLean of the electronics department. A bibliography of recent literature on television is included.

Bearing Races (935)

Ajax Electric Co. is offering reprints of an article, "Bearing Races Improved by Isothermal Treatment", by J. Paul Deringer, originally published in "Metal Progress."

Synthetic Rubber (936)

B. F. Goodrich Co. has a new edition of its catalogue section on properties of Ameripol D, an oil and heat resistant synthetic rubber. Illustrated.

Lighting Design (937)

"Super Service With Light" is another in the series of architectural lighting design booklets published by General Electric Co.

ELECTRICAL WEST, 68 Post St., San Francisco, 4, California
Please send me information about following CIRCLED items:

900	901	902	903	904	905	906	907	908	909	910
911	912	913	914	915	916	917	918	919	920	921
922	923	924	925	926	927	928	929	930	931	932
933	934	935	936	937						

Name..... Company*..... Title*.....

Address.....

* Please include your company's name and your position, as we cannot ask manufacturers to furnish literature unless you do.

AND A GREAT VARIETY OF OTHER APPLICATIONS

The electrical contractor who is familiar with the various uses of CurtiStrip has at his command scores of time and trouble-saving ways of installing lighting and other electric equipment. It is easy to figure your costs in advance when you use CurtiStrip and the finished job is neat and efficient.

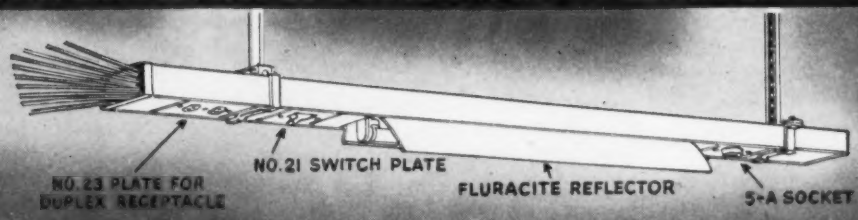
Primarily CurtiStrip is a large capacity wiring channel made with a patented snap-in cover plate, which is scored at 3" intervals and can be broken or cut to length and snapped into the lips in the channel.

Often used purely as a raceway it is a simple matter to install sockets or fittings on any spacing.

The fluorescent unit above shows one important CurtiStrip application . . . this material is ideal for either individual units or continuous line installation. Three reflector types . . . deep symmetrical . . . shallow symmetrical and asymmetrical permit adjustment to a variety of lighting tasks.

The sketch below shows the flexibility of CurtiStrip and how the convenient snap-in cover plate accommodates various fittings. Five different mounting hangers and brackets are available . . . again providing great flexibility in mounting. All in all there are so many advantages to CurtiStrip that it behooves you to write for complete data . . . today.

SKETCH SHOWS A FEW OF THE NUMEROUS CURTISTRIP FITTINGS



CURTIS Lighting, INC.

6135 WEST 65TH STREET, CHICAGO 38, ILLINOIS

ELECTRA'S HUSBAND

Experience Is a Factor

WHENEVER Electra is away, I bring home a briefcase full of magazines so as to catch up on my reading. The other night I had a copy of *Gas Age* among the lot because I've found that it frequently pays to know what the competition is thinking and doing. This particular instance proved to be no exception, for there was an intensely interesting article entitled *Kitchen Ventilation—a Major Sales Tool* in the issue I had taken from the company library. The further I read, the more intrigued I became because it struck me that the gas house boys were admitting some things that didn't help their competitive position.

For instance the article began with an admission that domestic gas loads are particularly vulnerable to competitive threats. It viewed with serious alarm the attempts of the electrical industry to improve its position in the domestic field, which is the backbone of the gas industry. In the face of the formidable threats to its business which the article recognized, the gas industry postwar planning committee has placed great emphasis on the range in setting up its New Freedom Kitchen program. The article tells why in words that should make the electrical industry's chest swell:

"All the surveys conducted throughout the country show that an alarming percentage of our existing customers would buy an electric range the next time they were to purchase a range. These figures range from 40% to 60% of our present customers." Then the author gives way to both hope and fear when he says, "This impression has not been borne of experience, but by what they have been led to believe."

Since there are almost five times as many gas stoves in use as electric ranges, even Electra's credulity would be strained in inferring that advertising and promotion alone could create such a favorable attitude toward the electric range. No, it must have been experience with electric ranges, but experience with gas stoves as well.

The author goes on to say, "Surveys show that this preference is because they believe the electric kitchen to be cleaner and cooler. This illusion has been developed by the tremendous advertising and merchandising power of the electric industry." Here again it isn't all promotion; experience is an important factor. Every survey ever made among electric range users has come up with cleanliness as a dominant reason for preference for electric cookery. "Unless we raise a question mark in the mind of the American housewife on the superiority of electric cookery as to cleanliness and coolness," the author predicts, "we may wake up and find a fashion started in postwar construction that will be most difficult to counteract."

Then comes the really damaging admission. "In order to place a question mark in the mind of the American housewife regarding her feelings that she must have an electric kitchen, in order to have cleanliness and coolness, it is necessary that we be in a position to offer a superior service which a gas range can do *if it is installed properly*. To analyze this problem a brief discussion of the fundamentals of kitchen ventilation is necessary." The author then proceeds to build a story about the necessity for kitchen ventilation irrespective of the fuel used and finally bases his conclusion on the superiority of the gas range on its use in a well ventilated kitchen. Isn't it rather revealing that customer preference for electric ranges has developed without any reference to kitchen ventilation?

After considerable discussion of vapors, odors, drafts, moisture and heat, the author comes to the conclusion that with kitchen ventilation, he is able, with the gas range, to achieve a kitchen that is cleaner and cooler, if installed properly. The converse conclusion would appear to be that without kitchen ventilation, gas range superiority can never be achieved.

The article then shows that the gas range will help in heating the house and in humidifying the air. How about the summertime when heat in the kitchen is the last thing the housewife wants and humidity is generously supplied by nature in most sections of the country? And what happens in the wintertime when the additional humidity might be desirable and the ventilating fan draws off all products of combustion including moisture? Maybe the gas industry can provide a "humidity separator" in its properly installed and ventilated gas range so that greases and other products of combustion alone may be disposed of in winter and humidity retained. Nor does the article suggest a "heat interchanger" either to be used in reclaiming the heat to heat the house while it is still assisting in the creation of a draft and in keeping the "gas-range-created" cooking vapors in a non-condensed state.

The author pays electric cookery another pleasing compliment by saying, "In recent years studies have been made which show very definite nutritional advantages from low temperature cooking, and this is now the universally recommended way of cooking, regardless of fuel or cost." This is the natural way to cook with an electric range although the author neglects to identify the place where low temperatures are used. For surface cooking operations, whether the source of heat is electricity or some other fuel, cooking is usually done at 212°. Thus no change of temperature is involved inside the utensil regardless of fuel. With electricity the tremendous loss of heat which occurs with other fuels is removed. Thus low temperature cooking assures cooler kitchens. With the exception of roasting, oven temperatures for baking cakes, biscuits and other things are not changed irrespective of fuel. The author pays the electrical industry an added compliment when he admits that roasting at lower temperatures—a technique long recommended by the electrical industry—gives better results than the method recommended by the gas range people for years.

Inferentially the author pays the electric range another veiled compliment when he says, "Electricity is a more expensive fuel for cooking and in order to keep fuel costs down, low temperature cooking is almost a necessity." In view of the tremendously increased efficiency with which the electric range applies the B.t.u.'s produced, the monthly cooking costs are about equal to gas except for one or two exceptional communities.

When Electra came home, I told her about the article. She voiced her preference in new language.

"Ventilation or no ventilation, gas fumes still inflame my sinuses. Even if they medicated the stuff the same way that they give it an odor, I still wouldn't like it."

Don't Lose Your GRIP!

Safety Tip: When you're using a wrench on a "frozen" joint a good grip is a "must". Avoid accidents and wrap the handle of your wrench with U.S. Security Friction Tape. You'll work more safely...and faster and easier, too. There's no end to the ways Security Tape can help you—in plant, shop or home.

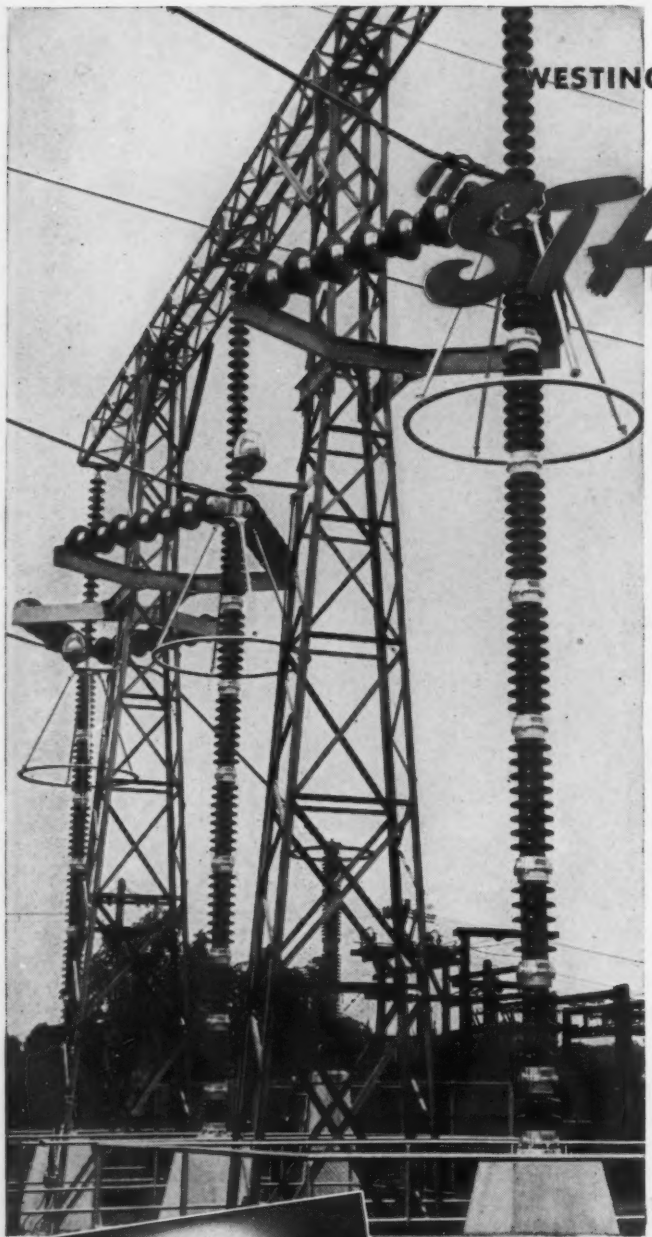
Play Safe — Use Security

Listen to "Science Looks Forward"—new series of talks by the great scientists of America—on the Philharmonic-Symphony program. CBS network, Sunday afternoons, 3:00 to 4:30 E.W.T.

UNITED STATES RUBBER COMPANY

1230 Sixth Ave., Rockefeller Center, New York 20, N. Y. • In Canada: Dominion Rubber Co. Ltd.

Serving Through Science



WESTINGHOUSE LIGHTNING PROTECTION

"STACKS UP"

TO ANY SUBSTATION REQUIREMENTS

. . . with Type SV Autovalve Arresters up to 287 kv

Four basic units—the 20, 25, 30 and 37 kv sizes—can be "stacked" to meet the individual voltage requirements of most substations. This flexibility often reduces height of "stack" . . . permits reduced and simplified stocking of spares. Smaller units, rated from 3 to 15 kv, are available for applications where still greater flexibility is needed.

The Type SV Autovalve Arrester combines low impulse spark-over with low voltage during discharge of lightning current, for maximum protection to expensive apparatus. The arrester will handle short-time surges of 100,000 amperes and long-time, low-current, "hot" lightning equally well.

The Westinghouse complete line of arresters ranges from these Type SV Arresters (which today are protecting some of the largest electrical generating plants in the world) down to thumb-size signal arresters safeguarding vital railway operations. It is the result of decades of continuous and exhaustive research in lightning protection.

Westinghouse has pioneered many new advances in the art of lightning protection—and today maintains one of the world's largest lightning research laboratories, in addition to its extensive field research. The results of this research and experience are yours in Westinghouse arresters.

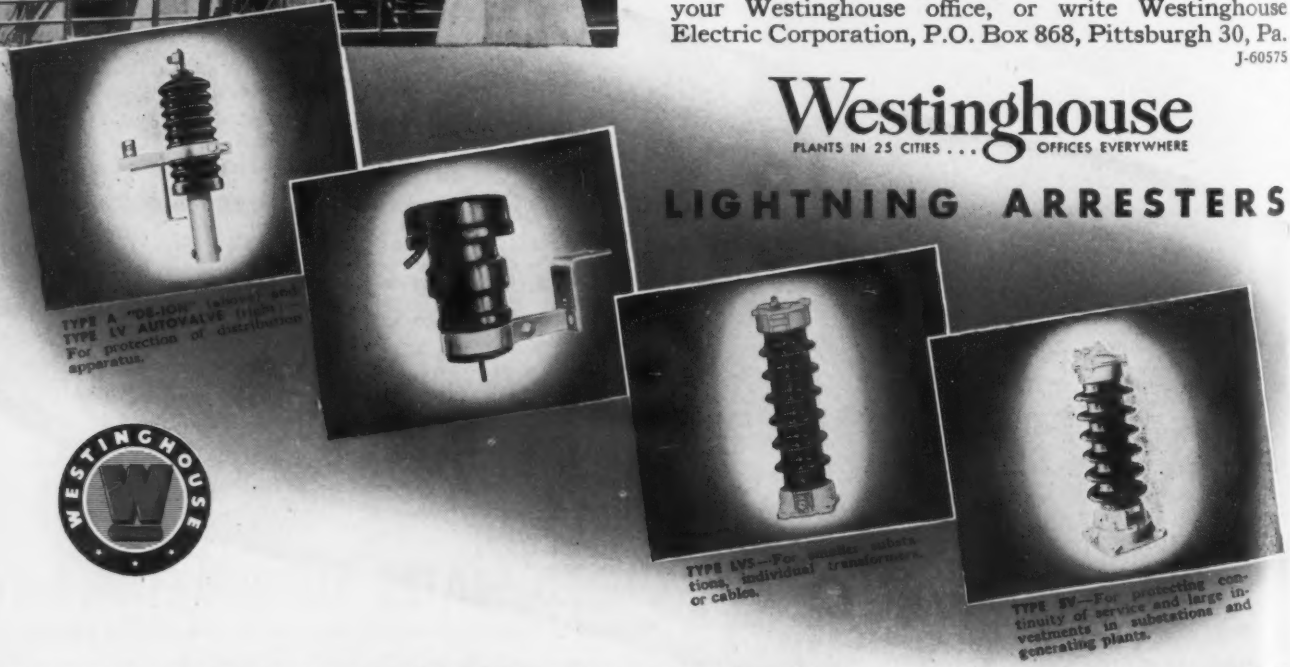
For help on any lightning protection problem, call your Westinghouse office, or write Westinghouse Electric Corporation, P.O. Box 868, Pittsburgh 30, Pa.

J-60575

Westinghouse

PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE

LIGHTNING ARRESTERS



TYPE A "DE-ION" (enclosed) and TYPE LV AUTOVALVE (open)—For protection of distribution apparatus.

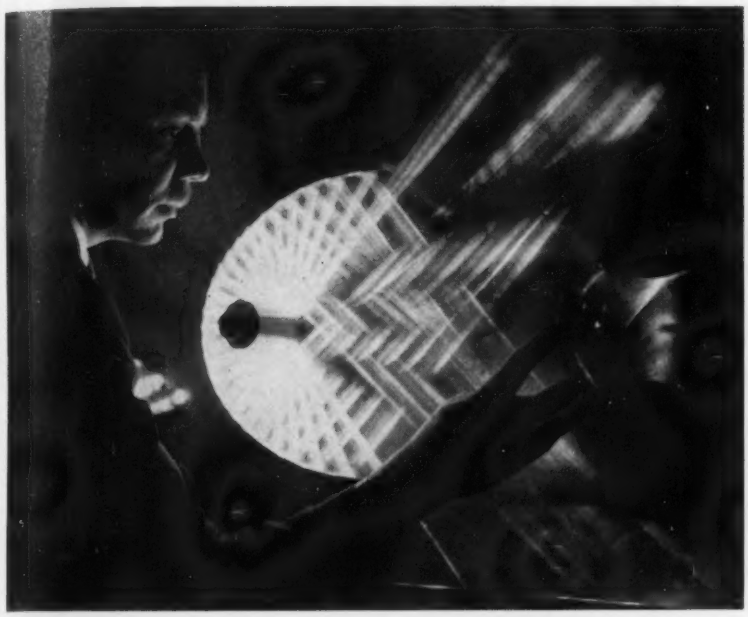
TYPE LVS—For smaller substations, individual transformers or cable.

TYPE SV—For protecting continuity of service and large investments in substations and generating plants.

THERE'S A WESTINGHOUSE ARRESTER FOR EVERY APPLICATION

ELECTRICAL WEST

SEPTEMBER, 1945
VOL. 95 NO. 3



A NEW FOCUS FOR LIGHTING

FIRST in reconversion should be lighting, for light sources never ceased being made during the war. They were merely drafted almost completely for war uses. True enough lighting went on short rations, like everything else, and substitutions had to do for many of its necessary accompanying equipment. But of all electrical utilizations, light fared best during the war. Even the dimout and blackout served only to emphasize the vital necessity for *more* light. In war production, higher levels of illumination than might have been attained in a decade were put to work to speed production and improve accuracy, as well as conserve materials by reduced spoilage.

Everyone in this industry has a stake in lighting—the oldest, the first use to which electricity was put. Not alone the lamp dealer, who sells lamps, or the contractor, who installs equipment, nor yet the manufacturer of fixtures and lamps, but the engineer who designs, the wholesaler who distributes, and the utility which serves electricity, and even the supplier of generating and transmission line equipment—all are beholden to lighting. It is the backbone of the electrical business itself.

Now is the time to refocus lighting. It has been turned as a beam upon war production during the past four years. That task is finished. Now the beam should be broadened again to flood a wide field of peacetime applications. All those areas of use, the domestic, the store, the office, the school, the street and highway, cut off from any increased use of light during the war years, need to be picked up again in the beam.

Material restrictions are off, even if it takes time to reassemble them to utilize in making lighting equipment for other than minimum war uses.

New light sources and lighting tools, accelerated in development by the war research and urgency, are available. Each offers a wide range of new applications.

Pent-up want for more light and for *change* is tremendous. The entire country is tired of the old; wants *new*.

Manpower should soon be more than ample. In fact there is a moral obligation to employ as many as possible in the period just beginning.

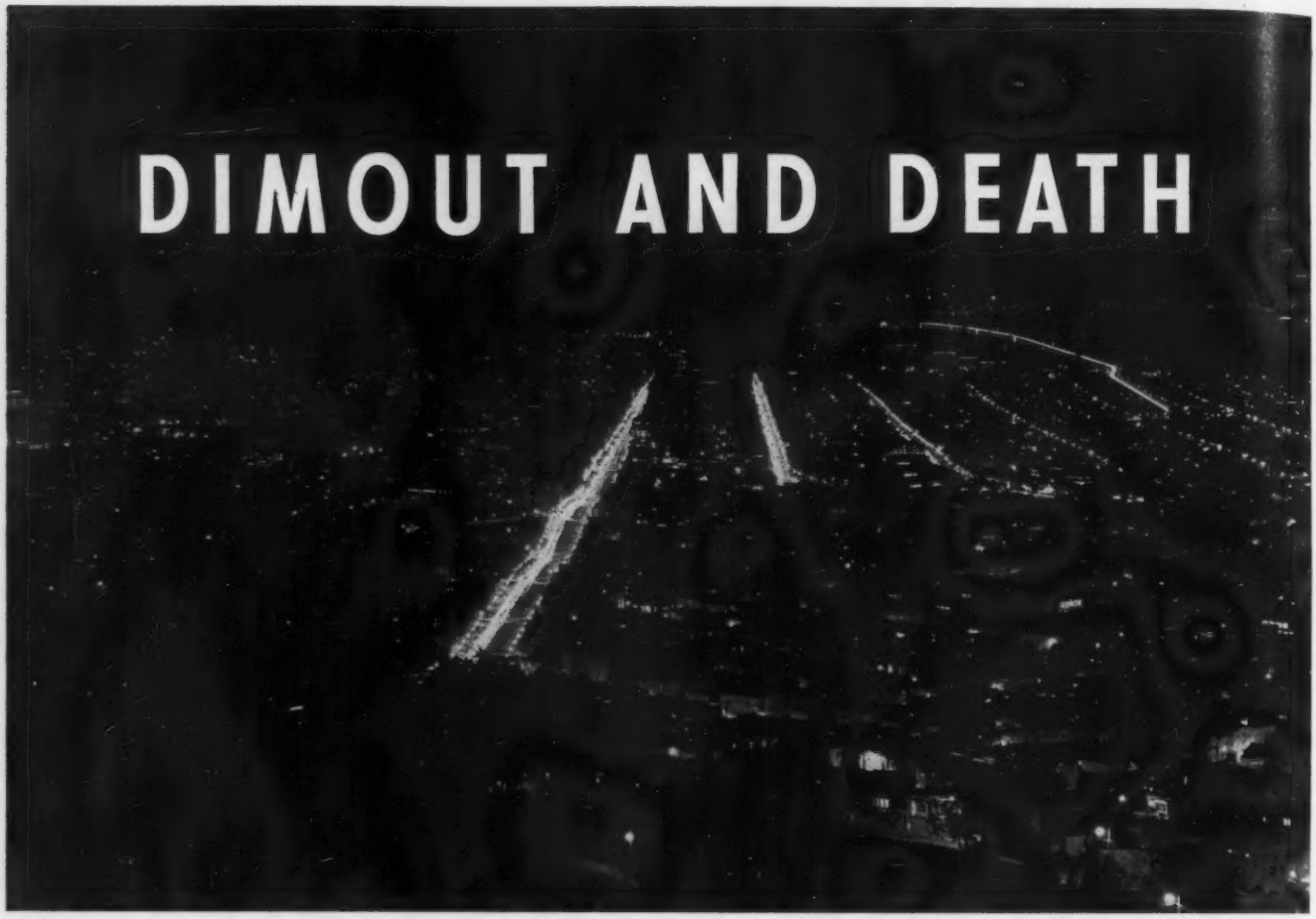
Sales training needs to be resumed. The day of holding off insistent buyers demanding equipment is gone. It will take intelligent salesmanship again, and keen competition will put a premium on skillful selling.

Engineering is more needed with these new light sources than ever before. Lighting has become complicated by the diversity of possible light sources.

Maintenance of lighting equipment can become a business in itself.

In these directions light is now beamed.

DIMOUT AND DEATH



Partners during the war, they will continue in grim business until cities relight traffic streets to reduce the toll—these realities were learned by the Bureau of Light, Heat and Power, San Francisco, in a seven-and-a-half-year survey. Conclusions here adduced from reports of A. O. Olson, bureau mgr., and G.Case Geraty, Jr., engineering inspector

NEXT day after Japan surrendered, the rationing of gasoline ceased. Out of every garage, along every street, popped the family cars. Americans took to the roads again.

With returned use of the automobile came back its hazards to life and limb. With it returned also the night accident rate and death toll. And so too returned the need to do something to lessen the disproportionate rate of death at night over day on streets and highways of the land; especially to reduce the larger number of pedestrians killed at night. Obviously the only reason for the difference between the night and day is a lack of *ability to see* on the part of the motor vehicle driver.

The "postwar period" of which so much has been talked and so much planned, is *here* now. It is insofar as the urgent need for improving *see-ability* on the streets and highways at night is concerned. The first order of business in all community planning should be to remove from peacetime living the greatest cause of death and casualties. (Traffic fatality figures for the first two and a half years of war show that automobiles killed two-thirds as many as did the weapons of war in the same period of time.)

As a measure of these hazards and to what extent light saves life, the research conducted over a seven-and-one-half year period (1937 through June, 1944) by the Bureau of Light, Heat and Power of the Public Utilities Commission of the City and County of San Francisco is highly significant. Very few cities have kept the records, made the analyses or interpreted the facts so conclusively. From its survey, San Francisco has a postwar program for improvement of street lighting, which consists of 142 projects at an estimated cost of $4,309,300.

An earnest city-wide effort to improve the lighting in San Francisco began early in 1937 and continued until the United States entered the war. The dimout reversed the program. Graph number 1 on an accompanying page illustrates concisely the history of night fatal accidents in relation to the lighting. Each year as the streets became better lighted the night fatal accident rate declined. The dimout caused a material reduction in lighting, which in 1943 caused a large number of fatal accidents, this is spite of reduced night driving. Thus the yearly increase in night accidents between 1937 and 1941 was not caused by a similar increase in the rate of travel, as indicated by the fact that no corresponding increase can be detected in the daytime accident rate.

Few realize fully that existing traffic hazards remain essentially unchanged throughout the 24 hours of the day, except that darkness conceals these hazards. Darkness tends to confuse and blind the driver of the motor vehicle and the pedestrian. It reduces the time allowance for life-saving reflexes. It subjects the eye to conditions with which it cannot cope. It increases the lethal potentialities of all other traffic hazards.

At night each foot of street becomes a danger zone that no sign can mark. No signals can safeguard the almost invisible pedestrian or minimize the fatal blinding glare of the headlights. No warning can dispel the illusion of safety or sharpen deadened or confused judgment. There is no way of localizing the problem, for it exists

wherever and whenever there is darkness.

Safety campaigns, directed to public education and enforcement of traffic regulations, together with improved automobile designs, have proved moderately effective in mitigating daytime accidents despite increased traffic volume and increased speed. Such safety campaigns, however, have little effect on the night accident rate.

Light is a separate field in traffic safety. Accident trends are peculiarly significant of nighttime conditions which are beyond the control of the automobile driver. Safety propaganda, to be effective, must be accompanied by measures that will improve night *visibility*. This means well engineered street lighting sufficiently extensive to be of real value.

Aware of this situation and realizing that statistical data were necessary to convince public officials, the Bureau of Light, Heat and Power of the Public Utilities Commission, began a study of the effect in January 1937. The accompanying charts and figures are derived from these studies.

Street lighting designed to promote traffic safety at night was advocated as early as 23 years ago by Dr. T. E. W. Leland, then coroner of the City and County of San Francisco. Dr. Leland placed the responsibility for certain traffic deaths upon the board of supervisors because they had failed to provide street lights for safe seeing at certain locations. In 1916 the city had installed on Market Street a high-intensity arc light system, which became popularly known as the "Path of Gold." No strictly traffic safety lighting was adopted by the city until about 1930, when standardization of certain ornamental lighting standards and luminaires was made for new boulevards. In 1931 these new standards and luminaires were installed along several boulevards, among them being Bayshore Boulevard, the scene of many night deaths. This was one of the main traffic arteries along which Coroner Leland had advocated adequate lighting.

When the new luminaires were installed there, accident records for nine months immediately following showed a 40% reduction in night traffic deaths. This more than justified the installation of a new lighting system from the economic standpoint.

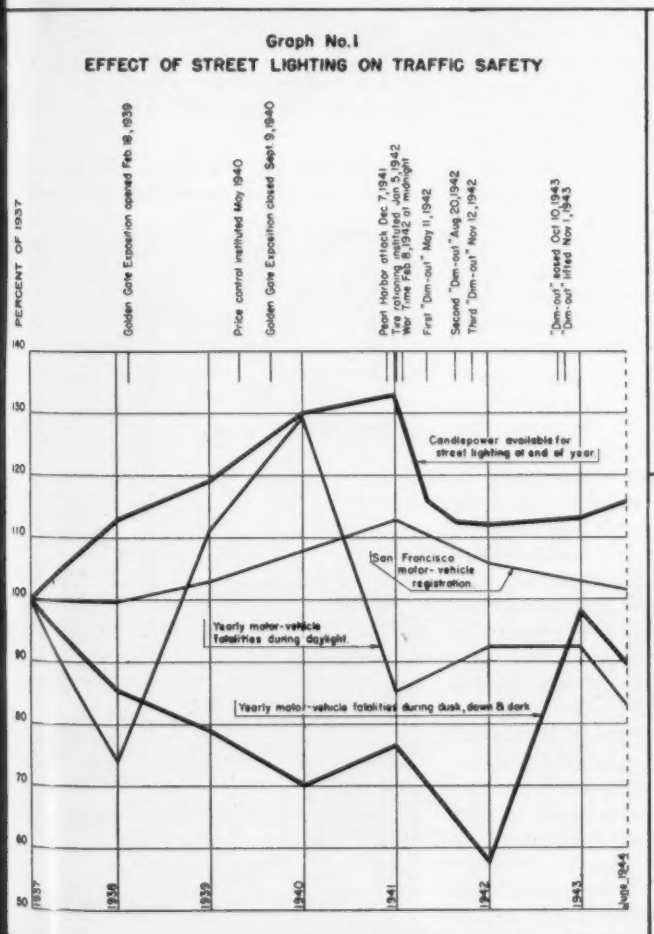
Improved lighting was installed on 1.7 miles of outer Market Street in 1937 and also 2.1 miles of Van Ness Avenue from Market to Bay streets. Van Ness Avenue, like Bayshore Boulevard, had long been notorious for its night motor vehicle deaths. Before the new lighting, motor deaths averaged six per year for four years. After the new lighting, motor vehicle deaths averaged two per year for four years.

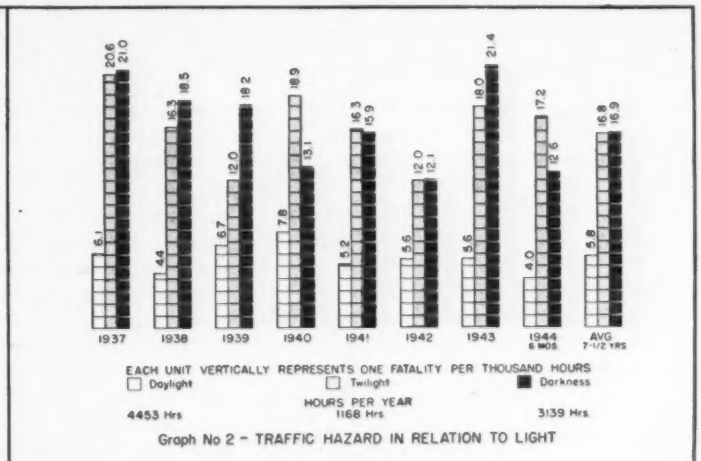
This four-year prevention of 16 deaths at an economic cost per death of $5,000, according to insurance companies, amounted to a total economic saving of $80,000. Cost of the improved lighting for four years was $42,800, including amortization and operation. The old lighting on the same four-year basis was $36,300. For a difference of $6,500 an economic saving

San Francisco Traffic Figures Prior to 1941

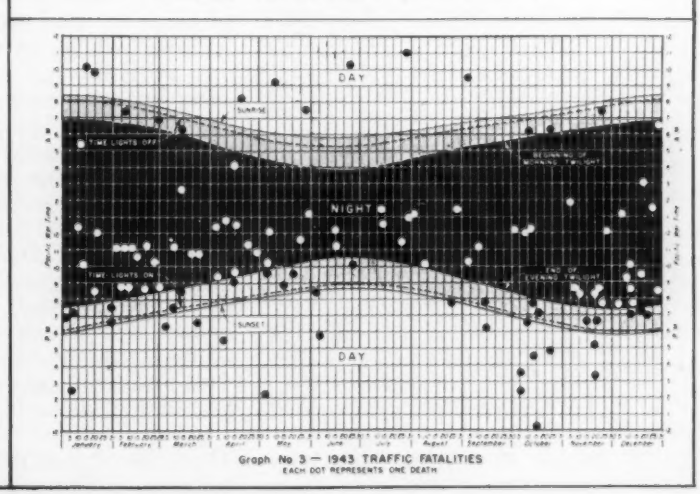
Annual Gasoline used...100,000,000 gal.
Annual Vehicle miles....493,000,000 car-miles
One fatality for..... 4,800,000 car-miles
30% of pedestrian accidents occur during the first three hours after sunset.
75% of all fatalities occur at night.
The "day" (7 a.m.-7 p.m.) volume is 67% of the 24-hour volume.
The "night" (7 p.m.-7 a.m.) volume is 33% of the 24-hour volume.
The "day" accidents (same hours) constitute 47% of the 24-hour accidents .
The "night" accidents (same hours) constitute 53% of the 24-hour accidents.
From these facts it can be deduced that the chances of accident at night are 2.3 times those in daytime.

Graphs 1, 2, 3, relate light to deaths

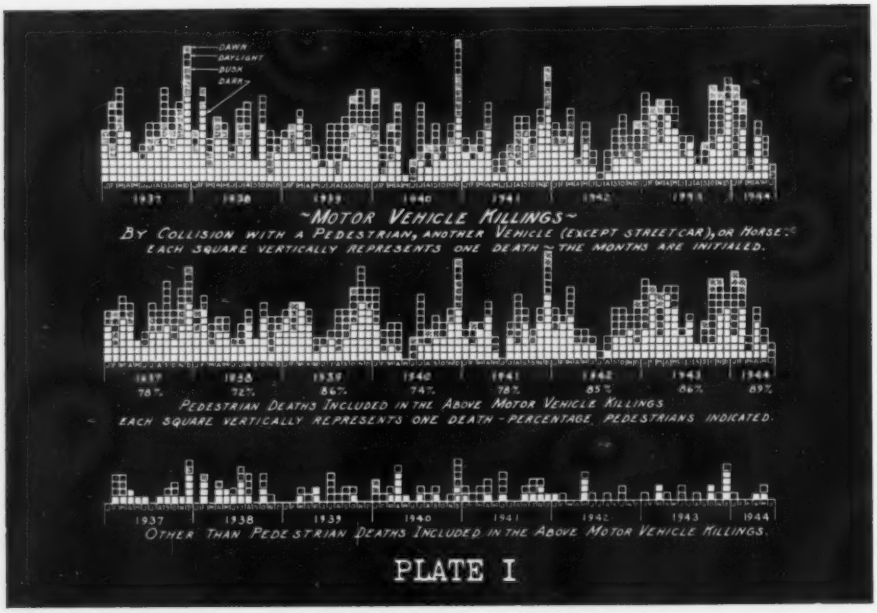

Graph No. 1
EFFECT OF STREET LIGHTING ON TRAFFIC SAFETY
PERCENT OF 1937
Golden Gate Exposition opened Feb 18, 1939
Price control instituted May 1940
Golden Gate Exposition closed Sept 9, 1940
Pearl Harbor attack Dec 7, 1941
Tire rationing instituted Jan 5, 1942
War Time Feb 9, 1942 at midnight
First "Dim-out" May 11, 1942
Second "Dim-out" Aug 20, 1942
Third "Dim-out" Nov 12, 1942
"Dim-out" eased Oct 10, 1943
"Dim-out" lifted Nov 1, 1943
Candlepower available for street lighting at end of year
San Francisco motor-vehicle registration
Yearly motor-vehicle fatalities during daylight
Yearly motor-vehicle fatalities during dusk, dawn & dark
1937
1938
1939
1940
1941
1942
1943
June 1944



Graph No 2 - TRAFFIC HAZARD IN RELATION TO LIGHT



Graph No 3 — 1943 TRAFFIC FATALITIES
EACH DOT REPRESENTS ONE DEATH


DAWN
DAYLIGHT
DUSK
DARK
1937 1938 1939 1940 1941 1942 1943 1944
~MOTOR VEHICLE KILLINGS~
BY COLLISION WITH A PEDESTRIAN, ANOTHER VEHICLE (EXCEPT STREETCAR), OR HORSE:
EACH SQUARE VERTICALLY REPRESENTS ONE DEATH ~ THE MONTHS ARE INITIALED.
1937 1938 1939 1940 1941 1942 1943 1944
78% 72% 86% 74% 78% 85% 86% 89%
PEDESTRIAN DEATHS INCLUDED IN THE ABOVE MOTOR VEHICLE KILLINGS.
EACH SQUARE VERTICALLY REPRESENTS ONE DEATH - PERCENTAGE PEDESTRIANS INDICATED.
1937 1938 1939 1940 1941 1942 1943 1944
OTHER THAN PEDESTRIAN DEATHS INCLUDED IN THE ABOVE MOTOR VEHICLE KILLINGS.
PLATE I

of more than $80,000 more than justified the investment. This says nothing of the sorrow and disruption of the homes caused by death or serious accident.

Three charts are assembled in plate 1 to depict various features of the motor vehicle killings in San Francisco over the seven-and-a-half year period. The charts indicate, by their shading, whether the deaths occurred at dawn, daylight, dusk or dark. It will be obvious from a study of these charts, first the large number of deaths during night; the high percentage of pedestrians killed, ranging from 72-89% of the total killed as shown by the middle chart; a very small number of non-pedestrians killed, and yet that 49% of these non-pedestrian killings occurred during the night period; 59% occurred during night and the treacherous hours of dusk and dawn combined.

Other studies made on a percentage basis revealed that from 178-400% more were killed during the hours of darkness than daylight. If the night traffic, which is approximately one-half that of daytime, causes twice as many deaths, then the traffic hazard after dark (with the resulting slaughter) is four times as great as in daytime. By such calculations, the death rate for the first six months of 1944 was 9.2 times as great during the hours of dusk as during daylight.

Graph 2 was prepared to show the effect of natural light on traffic safety. The time of day was divided into three important periods — daylight, twilight and darkness. The fatality rate for each period was shown graphically. This chart shows the night fatality rate to be approximately three times that of the day rate. On this basis, the traffic hazard at night is five times greater than in daytime. The graph shows a nearly equal fatality rate per 1,000 hours in twilight and darkness, but when the relative traffic volume is evaluated the hazard is greater at twilight when natural light is reduced and visibility impaired.

This tends to prove that twilight is inadequate for safe driving and leads to the conclusion that inadequate lighting, whether natural or artificial, is unsafe. As far as traffic safety is concerned, poor lighting is therefore as bad as no light at all.

The dimout was enforced during the greatest portion of 1943 and the traffic fatalities of that year were more numerous than during any other year included in the study. The 113 fatalities in the year have been shown with respect to time in graph 3, which also shows the new street lighting schedule. This new schedule was derived after field observations in these studies had shown its need. It was put into effect on July 1, 1944. Under it the lamps were lighted earlier in the evening and extinguished later in the morning, thus increasing the burning hours from approximately 4,000 to 4,080 a year.

Combined in one graph, number 1, is a progressive story linked with the events of the past seven and a half years. The first is a pronounced decrease in motor vehicle killings during the normal years 1937 to 1940, inclusive, as more and more candle power became available for lighting of the streets at night. During this time the population increased very little, but motor vehicle usage increased tremendously, as shown by the lines of Bay Bridge and ferries vehicular traffic. This was due to increased purchases of new automobiles and also by the large number of visitors to the Exposition. The nominal increase of motor vehicle traffic during 1939 of 12.8% over 1938 was due largely to the Golden Gate Exposition on Treasure Island and reduction of bridge tolls from 50 cents to 40 cents on June 24, 1939.

Pedestrian death ratio in this chart

The increase of motor vehicle traffic in 1940 of 37.7% over 1939 and of 5% in San Francisco registration, with almost no increase in population, reflects the beginning of wartime prosperity. Motor vehicle deaths decreased, however in almost the same proportion as candle power available for street lighting increased. By December 1938, candle power had increased 13% over 1937 and deaths decreased 14% below 1937. By December 1939 candle power had increased 19% over 1937 and deaths decreased 21% below 1937. By December 1940 candle power had increased to 30% over 1937 and motor vehicle deaths decreased to 30% below 1937.

It was during 1941 that war critical materials began to be restricted. Therefore, increase in candle power during 1941 was only 3% over 1940. Motor vehicle traffic, however, increased in 1941 to 84% over 1940, bringing a new high of 204% of the 1937 base.

During the last prewar year, San Francisco's motor vehicle registration increased at a rate twice that of 1940, and the population, which had been nearly static for ten years, increased at a rate four hundred times that of the previous year.

For automobile travel generally, 1941 was a year of all-time records.

Electroliers of this type will be used after the war in areas near the ocean

Perhaps the public sensed that it would soon be unable to use its cars and seemed to travel everywhere. Passenger car registrations in 1941 for the entire United States were 29,507,113, an all-time high. It was estimated in 1944 that there were 23,500,000 of these cars still operating. During that year of all-time high registration, 1941, the last peacetime year, new passenger car production was 3,744,300.

Small wonder that motor vehicle deaths bounced up 7% during 1941, 77% of the 1937 base with a 3% increase in street lighting as the only additional retarding influence.

In 1942 tire rationing was instituted Jan. 5, and followed by war time, Feb. 8, the first dimout May 11, the second dimout Aug. 20, third dimout Nov. 12 and gasoline rationing Dec. 1. These innovations had a dampening effect on public travel for pleasure.

Meanwhile street lighting grew dimmer and dimmer as candle power available for lighting the streets was reduced by extinguishing a large number of lights, blocking off the emission of light from the seaward side of many others. Rigid restrictions on the use of headlights made night traffic so hazardous and disagreeable that large numbers of people gave it up. Others restricted night driving to a necessary minimum.

Motor vehicle registrations in 1942 dropped 7%. By the end of the year, candle power available had dropped 21%, bringing it to but 12% more candle power than there was available at the end of 1937.

The Bay Bridge index of vehicular traffic growth shows an increase during 1942, although not so great as in 1941; the 1942 increase being only 8% over 1941, while 1941 had been 31% over 1940.

During 1943 there was a sharp decline in motor vehicle traffic, amounting to a drop of 14.5% from 1942, which, together with the continued decline of another 3% in motor vehicle registration, reflected the increased restrictions on the use of gasoline. Meanwhile the population increased 387% of the 1942 increase. The streets remained at the same level of darkness during most of 1943, for it was not until Oct. 10, 1943 that the dimout was eased and finally lifted Nov. 1. However, street lights could not immediately be turned on and it was physically impossible to remove the paint from thousands of pieces of glassware simultaneously with the lifting of the dimout.

With substantially no increase in illumination and about 40,000 more people walking than in 1942, the motor vehicle killings during the dark and dangerous hours of 1943 sharply increased from 58% to 98% of the 1937 base. This once more confirmed that light on the streets is the most important factor in reducing motor vehicle slaughter.

During the first six months of 1944 there was a phenomenal growth in population. It is estimated that the increase during this period was two and a half times that of the entire year 1943. Motor vehicle usage continued to decline with the poor quality of gasoline and restrictions on civilian use. In 1942 passenger cars used four and a half gallons of gas for every gallon that went to war. In 1944 the ratio changed to one-half gallon per passenger car to each gallon that went to war.

With the removal of paint shielding and hoods from street lamps and restrictions on automobile headlights, a marked decrease in dark hour motor vehicle killings occurred. From the end of 1942 to the end of 1943 there was a 6% increase in candle power available and an 11% decrease in motor vehicle deaths.

Even in the McClintock traffic flow study of 1937 is found a statement, following a report of San Francisco police records for the years 1934 to 1936, showing that 52.64% of motor vehicle accidents occurred during the hours of darkness: "It is generally concluded that the principal cause for increase in night accidents is due to the lack of illumination. Experience in other cities shows a marked correlation between fatalities and the degree of darkness to be found on the street. Cities which have reduced their street lighting cost have suffered marked increases, particularly in pedestrian fatalities."

It would seem, therefore, that the contention that death and injuries from motor vehicle accidents are in direct relation to the amount of visibility is not mere theory. The facts themselves substantiate it. The facts themselves are grim for each statistical figure of a death represents not only loss of a citizen, but tragedy, disruption of a home, economic loss and many other related tragedies which are not shown or evaluated in the graph accompanying such a study.

In the confusing twilight of dusk and dawn, when the silhouettes of persons and objects seem to mingle with their shadows and the details of moving and stationary objects are rendered indistinct, a motor vehicle operator is disconcerted and the pedestrian becomes perplexed. This is the time of day which generals in war have been accustomed to select for making the attack. Twilight makes difficult the discernment of the attacker from the surroundings because see-ability has decreased to the point of trickery. While total darkness brings forth in every individual a certain extra amount of caution, so long as there is some light, even though it be deceiving twilight, the mind ordinarily is lulled and caution is unduly relaxed.

The affinity of death and dimout is very close, whether it be in times of war or peace.

Along heavy traffic, divided thoroughfares, electroliers that are similar to these shown are to become standard practice

Better lighting caused Pearl Assurance Co. Ltd., San Franciso, to relight with Sylvania fluorescent fixtures as shown here

Surveys Show Selling Strongly Needed

WHAT are people going to do? Find the answer to that question and you can measure how much can be sold to them. Such is the need to know, in order to plan production and gear up for sales effort and to re-employ people from the war industries and the returning veterans, that America has done more research into what people may be expected to do when peace returns than ever before in history. Whether the answers obtained from these researches will prove to be accurate or merely wishful remains to be seen. But since they are the sole measure by which to gauge the future, they are valuable.

In the commercial lighting field, the most ambitious survey of opinion and fact in respect to fluorescent lighting was that undertaken at the request of General Electric Lamp Department by the lighting specialists of 90 public utility companies and municipal utilities in some 200 towns and cities in 40 states. Some 2,500 retail merchants and a similar number of office managers were interviewed and figures as to the consumption of their lighting systems were compiled. The significant figures from this survey are summarized on the opposite page.

Examination of these figures by Western representatives of General Electric Lamp Co. indicated to them that the results obtained from participating Western utilities were so closely typical of those of the nation as a whole as to make a further breakdown for the West unnecessary.

What these surveys bring out, more than anything else, is that most fluorescent jobs are being undersold, that almost half considered the job sufficient by a simple fixture substitution. Only 38% of the store merchants increased their lighting; 15% installed less than previously. (See facing page table).

To find out what influenced them to buy the fluorescent lighting, questions on this were also asked. Among the retailers it was some phase of cost that influenced 54.5%; quality of light 39.4% and modernization 21.9%. Of the office managers, better light played a more important part, accounting for 36.6%, cost 30.9%, more light 25.2%, modernity 17.1%, less heat 13.0% and employee health and efficiency 4.9%.

What was considered the top limit in foot-candles by office managers was of significance. The largest percentage, 25.7% agreed on from 50-55 f-c. Only 5.7% wanted higher; 2.9% wanted only 15-20 f-c., 8.6% wanted 20-25 f-c., 8.6% wanted 25-30 f-c., 11.4% wanted 30-35 f-c., 14.3% wanted 35-40 f-c. and 11.4% wanted 40-45. Ten per cent were undecided.

Other Surveys

Another survey conducted by the National Association of Retail Grocers and the *Saturday Evening Post*, covering 1,365 retail grocery stores, of which 182 or 13.3% were in the Pacific states, and 79, or 5.8% were in the Mountain states, indicated that 46.6% planned to remodel or enlarge their stores as soon as materials and men became available. Of these 51.2% planned a new front. Of those planning to remodel, 52.1% planned new lighting fixtures, 81.7% planned that they would be fluorescent and 2.4% incandescent. One in four planned new exterior signs, 58% of which were to be illuminated signs.

Because the new long thin lamps had not yet been announced when the previous surveys had been made, editors of ELECTRICAL WEST made a spot check on a number of office building managers to test their reaction to the new light source. They were asked generally if they planned relighting and what type of lighting they planned to use.

In nearly every case, these building managers were found to be somewhat confused by the entire lighting situation. Too much new had been sprung on them recently for them to be able to digest and evaluate. They were inclined to want to wait until they knew more about the new light sources and their application. They were inclined also to have misconceptions as to just what these new lighting methods can do. It was clearly indicated that the industry needs to do a thorough job of clarification and of informing these influential buyers of lighting equipment.

Every indication points to a big opportunity, but that the industry must prepare to sell intensively and intelligently if this opportunity is to be realized.

Significant Figures from a National Fluorescent Lighting Survey

Among Office Managers

— 73.3% of office managers had planned layouts made

— 53.3% of jobs were initiated by renters

— 47.9% of office managers decreased their interior lighting load, showing 4.4% increase in kwh.

— 38.5% of meter readings of total office use dropped

— 60.4% of office managers used lights longer as shown by the records

— 30.9% of office managers were prompted to purchase by some cost saving

— 83.8% obtained more light than before

— 50.4% in interviewers' opinion, bought inadequate jobs or were undersold

— 36.8% more kw. could have been sold for interior lighting

— 40.4% of office managers buying were influenced by neighbors

— 61.5% of office managers got advice from utility before purchases

— 82.9% of office managers who will buy more, will now seek advice from utility

— 37.3% of the office managers now using filament lights hope to purchase or request more fluorescent

— 10.5% are undecided

— 52.2% will not

Among Store Merchants

— 67.5% of merchants decreased their interior lighting load, showing

— 7.8% decrease in kwh.

— 62.9% of meter readings dropped

— 60.96% of stores put fluorescent in windows with an accompanying decrease in wattage of

— 44.44%

— 55.1% of merchants used lights longer as shown by the records

— 54.5% of merchants were prompted to purchase by some cost saving

— 97.9% obtained more light than before

— 81.2% in interviewers' opinion, bought inadequate jobs or were undersold

— 52.8% more kw. could have been sold for interior lighting

— 53.3% of merchants buying were influenced by neighbors

— 28.6% of merchants got advice from utility before purchase

— 74.0% of merchants who will buy more, will now seek advice from utility

— 65.9% of the merchants now using filament lights hope to purchase fluorescent

— 18.0% are undecided

— 16.1% will not.

(As summarized from the General Electric Survey, by Electrical World)

There's a Market for Many in Maintenance

FLUORESCENT lighting is not like incandescent. It requires maintenance. Incandescent lamp maintenance is needed, too, but in small or medium sized installations the janitor or most anyone can relamp and clean the fixtures. But with fluorescent lighting the size of the lamps, the auxiliary equipment, such as starters, sockets, ballasts, large sheets of glass, plastic or metal louvers, etc., make maintenance a job for a specialist. Even the small store or office needs qualified maintenance service.

Where there is such a universal need, there is the potentiality for a good business. Lighting maintenance, organized soundly and handled efficiently, should make good business for a number of electrical contractors in each community. It likewise should provide steady employment for many men.

Each of the major lamp companies, General Electric, Sylvania and Westinghouse, has developed a plan for such a maintenance business. G-E calls it "Certified Lighting Service," Sylvania "Fluorescent Lighting Maintenance Specialists," and Westinghouse "Specified Maintenance Service."

Each makes available to the contractor printed contract forms, advertising literature, suggested letters and identification stickers and signs. Likewise, it outlines the procedure that it recommends to the contractor for setting himself up in the maintenance business, suggesting the amount of stock required, the tools and equipment needed, and furnishing servicing guides for trouble shooting and correction of all the various things that may conceivably go wrong.

By-product of this type of service, it is pointed out, can be a great deal of new installation business. National surveys show that 81% of the fluorescent installations in stores and offices are below what they should be in lighting standards. With the war over and restrictions lifted, many jobs only partially completed may be developed into fully adequate lighting installations.

Types of Service

Several classes of service can be offered fluorescent lighting customers by the contractor set up for such maintenance work. These include:

1. Lamp and starter replacement only—without cleaning—either on call or by regular routine monthly rounds.
2. Cleaning of lamps and fixtures as well as lamp and starter replacement, on a regular monthly or periodical schedule.
3. Yearly complete lamp replacement at a scheduled time, plus lamp replacement in between times as burnouts occur.
4. Supplementary services, such as lighting level checks, voltage checks, even to a repainting of ceilings and walls under yearly contract.

Basis for charging for such services is suggested in most of these programs, yet in each case the figures or examples cited are for consideration by the contractor in relation to his own overhead and the cost and type of labor he must employ for this work.

Obviously the hiring of a full journeyman electrician for fixture cleaning and lamp replacement work would run up the per-fixture charge that would have to be made to the customer, whereas if arrangements can be made for a lower scale for this maintenance work, the proposition can be made more inviting to clients. For strictly electrical work, such as fixture moving or replacement of ballasts or sockets the electrician would be required.

Those contemplating this type of service are asked to bear in mind the realities of such a program. They are urged to make a real survey of the potential customers to whom they can reasonably expect to sell this service in their particular area or field of service. Some business communities will be found to be too small to support this type of operation. An area of heavy industrial plants may be poor prospecting, too, if each plant has its own maintenance crew. Likewise, if too many go into this work, there may not be market for all. All these factors should be considered.

Intelligent selling will probably be required in many cases to close contracts. Many users of fluorescent lighting do not yet know what it costs to keep their installations at par. The necessity to keep them lamped and to replace lamps that have burned beyond their economical life in order to keep up efficiency, needs to be sold. Most of the lamp companies offer sales helps and even sales training in these respects. With such a need for a service there is good business in developing it.

WESTINGHOUSE SPECIFIED MAINTENANCE SERVICE
PROTECTS YOUR LIGHTING SYSTEM!
SAVES YOU TIME AND MONEY!

FLUORESCENT LIGHTING MAINTENANCE
SPECIALISTS

CERTIFIED LIGHTING SERVICE
WITH
GENERAL ELECTRIC MAZDA LAMPS
LAYOUT · INSTALLATION · MAINTENANCE

Opportunities in Lamp Sales for Home Use

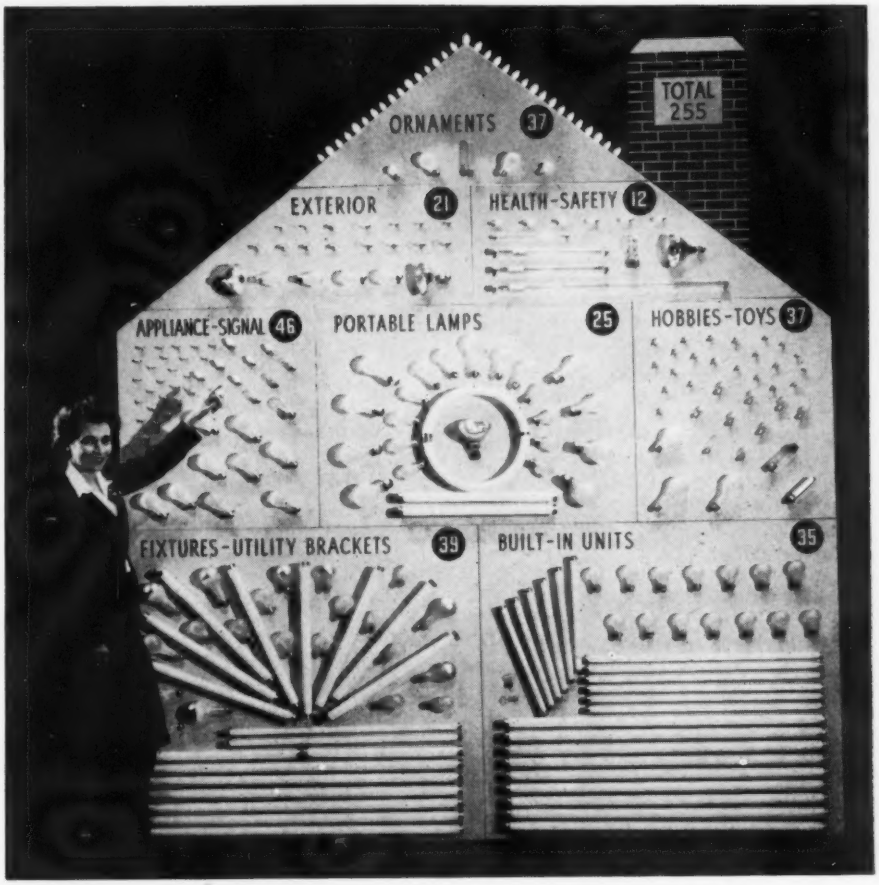
Moving sun indoors offers 255 sockets to be filled

WHEN Mary Webber flashed upon Western audiences the "Sunshine Home" with its 255 lamps in 132 places, which she said would take care of a good six-room house adequately, and provide a connected lamp load of 11 kw., there was scarce time left in her rapid-fire sweep through the house to go into detail as to *where* and *how* these 255 lamps would be used.

Consequently a breakdown of these uses was asked of General Electric Lamp Department as an index of the lamp sales possibilities for dealers. First each room is named and in it the places wherein lamps may be used. Then a summary of lamps by types of use or application follows, with an estimate of proper wattage. As a first step toward appreciating these potentialities, it is suggested that each reader, presumed to be a member of the electrical industry, list the lamps in his *own* home and check it against this potential total.

To dealers who feel that, since every dime store, grocery and drug store carries lamp bulbs, there is no business left in lamps, let it be said that these types of store carry only a very limited line of the most commonly used lamps. A. L. Stone of Los Angeles, prominent electrical contractor, owner of a modest electrical store off the beaten path of merchandise traffic even, testified to the value of lamp business at a recent meeting of electrical contractors. He declared that by making his store the place where customers can be sure to get *all* types of lamps, even the odd ones, the rare ones, the miniatures, the projectors, the pilot and indicator, the toy and decorative lamps, even the department stores send customers to him for lamps they do not care to stock themselves.

The following outline, to any dealer of imagination, gives a clue to development of a special type of lamp service business in home lighting alone. The commercial and industrial field is just as rich a source of lamp sales.



LAMPS FOR A SIX-ROOM HOME

Living Room

Ceiling fixture.
Six portable lamps.
Window valance lighting.
Lighted book case.
Picture lighting.
Lighted ornaments.
Lights in radio, clock, phonograph.

Dining Room

Ceiling fixture.
Two recessed spotlights over table.
Window valance.
Lighted china cupboard.
Lighted ornaments.

Dinette

Ceiling fixture.
Pilot in convenient outlet.

Kitchen

Ceiling fixture.
Recessed fixture over sink.
Bracket over work counters.
Germicidal in refrigerator, storage cabinet.
Lights in refrigerator, range oven.
Clock face lighted.
Indicator lamps in appliances.
Pilot lights on stairs to cellar or garage.

Bath

Ceiling fixture.
Wall brackets for shaving mirror.
Heat lamp.
Sunlamp.
Night light.

Utility Room

Three ceiling fixtures over tubs, ironing board.
Reflector spot.
Lights in ironer, washing machine.
Light on vacuum cleaner.

Bedroom No. 1

Ceiling fixture.
Four portable lamps.
Night light.

Bedroom No. 2

Valance lighting.
Built-in unit over dressing table.
Two portable lamps.
Night light.
Two brackets at full length mirror.
Lamps in radio, clock, sewing machine.
Heating pad and electric blanket indicators.

Halls

Four ceiling fixtures.
Portable lamp.
Recessed light for mirror.
Night lights.

All Closets

Wall brackets on door switch.

Recreation Room

Two ceiling fixtures.
Four portable lamps.
Built-in unit (bar).
Window area (decorative).
Germicidal.

Garage

Two ceiling fixtures.
Trouble lamp.
Exterior floodlight.

Exterior

Lighted house number.
Door bell, key hole indicators.
Three brackets, floodlights.
Decorative garden lighting.

General and Hobbies

Switch indicators.
Christmas tree lights, interior and exterior.
Flashlights.
Doll house.
Toy trains.
Photographic lamps.

LAMPS BY CLASSES OF USE

1. Portable Lamps (25 lamp bulbs—19 installations)

Three 40-watt.
Five 60-watt.

One 75-watt.
Three 100-watt.
One 150-watt.
One 150-watt reflector spot.
Four 50-100-150-watt.
Four 100-200-300-watt.
Two 20-watt fluorescent.
One 40-watt circular fluorescent.

2. Center Fixtures and Utility Wall Brackets (39 lamps — 27 installations)

Five 40-watt.
Seven 60-watt.
One 100-watt.
One 150-watt.
Two 60-watt silver bowl.
One 100-watt silver bowl.
Four 150-watt silver bowl.
Ten 20-watt fluorescent.
Two 30-watt fluorescent.
Six 40-watt fluorescent.

3. Built-in Units—Functional and Decorative (37 lamps—10 installations)

Twelve 40-watt.
Two 60-watt.
Six 30-watt lumiline.
Six 30-watt fluorescent.
Nine 40-watt fluorescent.
Two No. 1183 6 volt 50 candlepower.

4. Decorative Ornaments (37 lamps—7 installations)

Two 40-watt.
Two 10-watt.
One 25-watt T-10.
Thirty-two Christmas tree.

5. Exterior–Yard–Garden (21 lamps—8 installations)

Four 40-watt.
One 3-watt.
Ten 20-watt S-11.
Two 150-watt reflector flood.
Two Mazda No. 44.
Two No. 112 flashlight.

6. Health and Safety (12 lamps—12 installations)

Six 7-watt (nite).
One 250-watt R-40 (heat).
One S-4.
One 8-watt germicidal.
Two 15-watt germicidal.
One 30-watt germicidal.

7. Appliance Use and Signal Lights 47 lamps—40 installations)

Seven 7-watt.
One 15-watt.
One 25-watt T-8.
One 25-watt (range).
One 60-watt.
Nine 100-watt.
Sixteen NE-2.
Two 6-watt S-6.
Two No. 44.
Two 15-watt T-7.
One No. 416.
Two No. 41.
Two No. 14.

8. Hobbies and Toys (37 lamps—9 installations)

Ten No. 1494 G-6 7½-watt.
Twelve toy train lamps.
Eight No. 5 photoflash.
Two No. 2 photoflood.
One 6-watt S-6.
One 25-watt T-8 (half silvered).
One 150-watt T-8 projector lamp.
One 500-watt T-10 projector lamp.
One 150-watt No. 212 enlarger lamp.
TOTAL—255 bulbs in 132 places—11,000 watts.

Ultraviolet Protects School Children

Wedge Weber

Sales Manager, Pacific Ultraviolet Co.,
Los Angeles, Calif.

IT is common knowledge that a certain portion of the spectrum of the sun is the greatest bacteria-killing agent known to man. (2537 AU) Modern science was presented with the problem of bringing inside that portion of the sun's spectrum in order that people in buildings might be given the same protection against diseases caused by air-borne bacteria they are afforded in sunlight. Dr. Harvey C. Rentschler of Westinghouse Electric Corp. developed an ultraviolet ray lamp which could imitate satisfactorily the bactericidal portion of sunlight so that man can enjoy bactericidal protection when indoors.

In a few seconds, this ultraviolet ray lamp completely sanitizes surrounding air and, as the normal convection or circulation of air in a room takes place, the bacterial content of the air in that room is constantly reduced.

Schoolrooms, where children are placed in close proximity to one another, are hotbeds of contagion. Epidemics of children's diseases are likely to spread very rapidly in schools, where children spend the greater part of each day in crowded classrooms.

Therefore, installations of ultraviolet ray lamps have been made, both from the experimental and practical angle, to ascertain the effect of ultraviolet ray light for reducing absences due to epidemic diseases. One such experiment was conducted in the German town Friends School. During the first year (1937-1938), 89 children in four primary classes were protected by ultraviolet ray lamps, and the same number of similarly susceptible children in four corresponding classes were not protected. Seven introductions of mumps into each group resulted in twelve secondary cases in the unprotected group and only two in the protected group.

Chickenpox introduced 21 times into the primary department (average susceptibility 59.8%) between December and the closing of schools (1939-1940), resulted in only seven possible secondary infections. An explosive outbreak in one particular class singled out to rehearse a school play in an unirradiated auditorium, however, exhibited a typical air-borne pattern. This class was exposed to a single case of chickenpox; and between the fourteenth and the twentieth day following the first day of exposure, 15 out of the 16 children had this disease.

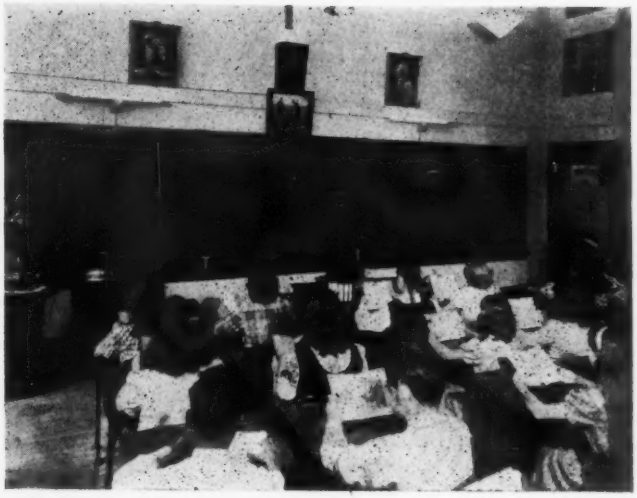
Westinghouse Sterilamps were installed in six of the school rooms of the Saint Nicholas' School at Atlantic City during the school year 1943-1944. There was a noticeable decrease in the absences of both teachers and pupils from respiratory illnesses during the winter of that year. A comparison of the monthly figures on attendance between the years 1942-43 and 1943-44:

	1942-1943 (without lamps)	1943-1944 (using lamps)
October	223	144
November	223	82
December	292	186
January	397	360
February	480	198
March	308	342
April	278	137
May	420	172
June	42	69

In the Central School, Homewood, Ill., an interesting comparison of absences was noted between the time when the rooms were not irradiated by ultraviolet ray light (September, October and November) and the time when ultraviolet ray lamps were installed in December, in one classroom:

1942-1943	Room 102	Room 104
September	53	10
October	32	28
November	41.5	33
December*	50.5*	71.5
January	47	69.5
February	30.5	59.5
March	59.5	106.5

* Sterilamps installed in room 102 only at this time. Room 104 not equipped.



Six Sterilamp units for schoolroom area of 900 sq. ft. were installed above blackboard level in Clearwater, Calif., School

Another comparison of student absences was obtained in the second and third grade class rooms of the Elm Street School at Plattsburg, N. Y. It is interesting and possibly significant that the number of days absent declined to a much greater degree than the number of absences.

Six Sterilamps were installed in the class room occupied by first grade pupils in the morning and second grade pupils in the afternoon, at the Los Cerritos School of the Clearwater School District in Clearwater, Calif. The Grove Avenue School of the Clearwater School District, occupied by third grade pupils in the morning and second grade pupils in the afternoon, was equipped with Sterilamps. The school officials of the district made the following conclusions and observations:

1. "The attendance of the children using the rooms equipped with Sterilamps was improved.
2. "The usual epidemics of colds, measles, whooping cough, chickenpox, and other children's diseases as reported by our school nurse did not occur. In not one instance did we have a group of children infected by a contagious disease as is usually the case in the primary grades."

The officials of this school district are so pleased with the results obtained in 1945 that they feel that an installation of Sterilamps is warranted in all rooms used by the primary grades.

Absences due to respiratory diseases only

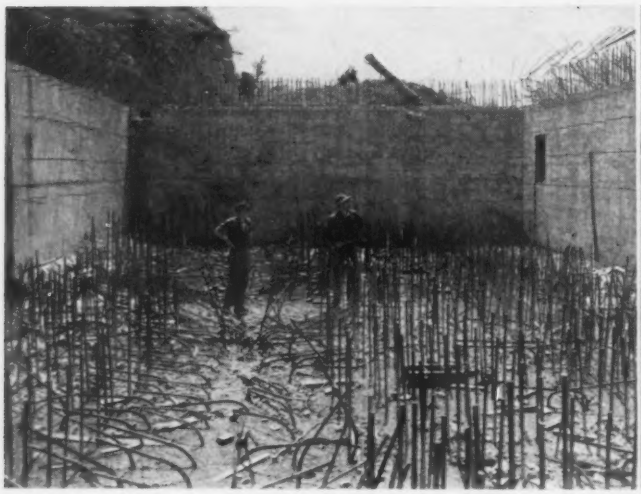
Week Beginning	Second Grade WITHOUT Sterilamps No. Students Absent	No. Days Absent	Third Grade WITH Sterilamps No. Students Absent	No. Days Absent
October 25	6	15	1	2
November 1	6	7	2	2
November 8	2	2	4	7
November 15	3	7	5	6
November 22	10	13	3	5
November 29	11	22	4	11
December 6	18	38½	3	9
December 13	21	68½	4	13
December 20	9	24	7	8½
January 3	13	44½	9	23
January 10	13	40½	6	19
January 17	14	37	7	10½
January 24	11	32	7	15½
January 31	6	18	5	12
February 7	7	14	4	4
February 14	10	28	4	4
February 21	4	7	3	2½
February 28	1	2	7	11
March 6	3	3	6	9½
March 13	5	10	6	8
March 20	12	31	4	9½
March 27	10	38	4	8
April 3	7	24	1	1
April 17	9	30	3	2½
April 24	9	43	2	3
May 1	6	24	0	0
May 8	8	18	1	½
May 15	4	5	1	5
May 22	2	6	1	1
May 29	0	0	0	0
	240	652	114	219

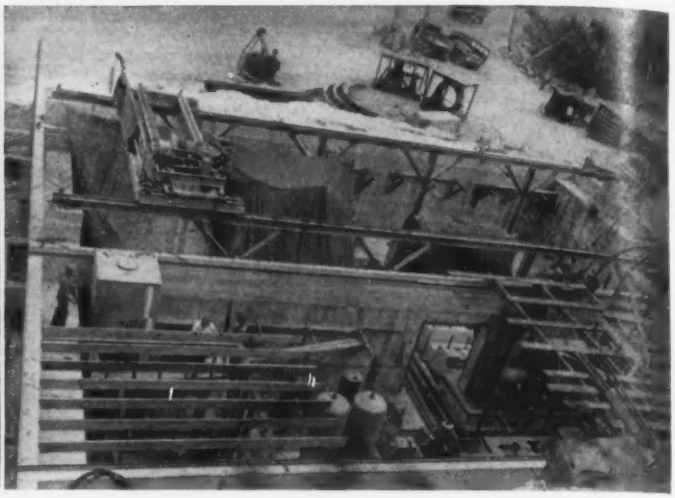
Number of students in second grade 48
Number of students in third grade 44
Area of rooms ..... Same
Location of rooms ..... Adjoining

IES Have Standards

Home lighting recommended practices have been issued for the first time by the Illuminating Engineering Society. The report, prepared by the IES committee on residence lighting, appearing in the June issue of the official magazine, *Illuminating Engineering*, is soon to be made available as a 40-page, 6 x 9-in., illustrated booklet with cover.

The findings are based on years of experience of home lighting specialists and represents the work and study of the committee on such topics as fundamentals, color, light sources, built-in units, fixtures, placement of lamps and foot-candle recommendations for numerous seeing tasks. Each room is studied separately and specific recommendations are made for its lighting. Drawings suggest fixture types. Illustrations show lighting results in rooms so illuminated. The standards will be available at IES headquarters, 51 Madison Ave., New York 10.





Sea Bees Complete Power Plant on Guam

Jap occupation of Guam with plundering of material and taking of workmen as prisoners delays but does not prevent completion of 2,400-kv. Piti diesel plant. Many shortcuts are taken by SeaBees

Lieut. W. A. Lawrence
(CEC) USNR

AFTER four trying years of interruptions and delays, troubled by a hostile Jap occupation, an internment of more than one hundred American workmen as war prisoners of the Japanese, a wholesale Jap plundering of all building materials, a diversion of plant equipment and an American bombardment and recapture campaign, the much-fought-over Piti power plant on the Island of Guam is at last nearing completion.

Work on the Piti plant, so-called because of its nearness to Guam's prewar village of Piti, was started back in the peaceful fall of 1941 by the Pacific Naval Air Base Contractors under the Navy's Bureau of Yards and Docks. Original bureau plans called for a bombproof building measuring 74 x 84 ft. in over-all dimensions—a massive structure with 4-ft. thick reinforced concrete walls and a double-slab concrete roof calculated to withstand all but the heaviest of direct-hit enemy bombs. The PNAB contractors had moved all their heavy equipment ashore, had accumulated large stores of lumber, cement and steel, and had poured concrete for the building footings, base slab, and walls before the first Jap bomb came whistling down to announce the Pacific war on Dec. 7 (Dec. 8, Guam time). Two days later the all-conquering Jap troops poured ashore, and that was the end of PNAB's brave effort in plant construction on Guam. The more than one hundred key employees of the contractors, Americans all, were herded off to the misery of prison camps in the Jap homeland. According to the reports of the Guam natives, few if any of these Americans have ever found their way back to the United States. Much of the contractors' equipment, the bulldozers, cranes, shovels, and compressors, was shipped off to Jap-held Saipan and Tinian, and perhaps to the Jap homeland. And the contractors' large material stocks were likewise confiscated and shipped to other Jap bases—or, worse, were used on Guam in the construction of tight little pillboxes and gun positions which had to be taken back during the American reoccupation campaign by the weary slogging Marines.

On the building itself, the Japs did virtually nothing. They stripped off the remaining form lumber for use as tunnel reinforcing in their many hillside caves. They flattened down a large part of the vertical base-slab reinforcing steel to make room inside the heavy building walls for storage of ammunition. And they stole the engine off the contractors' only remaining concrete mixer for purposes known only to themselves. And that about sums up the Jap contribution to the Piti plant progress. In its unfinished state the building stood for more than two and one-half years, an open rectangle of concrete walls bristling with rusting reinforcing steel and cluttered with the abandoned tools and materials of the interrupted builders.

Top left—What the Piti plant looked like after Jap occupation. Fortunately walls were intact and concrete level remained 3 ft. below floor grade with reinforcing still in place. Right—Plant is taking form. Original crane was cut down and too short to span engine room walls so rails were supported on rows of H-columns set out from the walls

Survives Recapture Battle

When American forces reoccupied the Island late in July of 1944, SeaBee engineers under Commodore W. O. Hiltabidle's big Naval construction brigade were quick to investigate the status of the plant and were considerably relieved to find it undamaged. Several months earlier, during the operational planning phase for the Guam assault, these same engineers had studied aerial photographs of the roofless structure and had decided that it was still very much status quo. The big question was whether or not it would survive the pre-invasion softening-up process.

Fortunately, the target-hunting American dive bombers, seeing nothing sinister in the gaping structure, spared it

from any direct bomb hits, and the surrounding hills protected it from heavy surface gunfire. With only a few pock-like bullet holes on its outer walls to mark the brief recapture campaign, the building was pretty much as the ill-fated contractors had left it.

Generators Diverted

At the time Guam was grabbed by the Japs, the two 500-kw. diesel-powered generators for this plant were already enroute from the mainland. Foreseeing the long slow fight ahead, the Navy decided to divert these machines from the inaccessible Guam plant to a more immediate need at Pearl Harbor. Accordingly, the machines, originally wound for 6,600 volts, were rewound for 2,300 volts and diverted to a new bombproof plant buried deep in a hillside tunnel on Oahu Island. Here they were installed and operated for nearly a year and a half as an integral part of the Pearl Harbor power system before they finally made their way to Guam.

Finding the Piti plant structure in such excellent condition, SeaBee engineers undertook the job of plant completion just as soon as forces could be made available from the more immediate tasks of the early reoccupation days. They contacted Pearl Harbor and obtained a release on the two 500-kw. machines originally intended for Guam. They wired the Bureau of Yards and Docks for complete plans on the plant which had been drawn up five years earlier. They asked the bureau to order two more generators to bring the plant up to full four-machine capacity. Then they went after the job of designing a serviceable roof structure for the existing building, something which would avoid the costly bombproofing originally specified and would utilize materials at hand.

Quonset Huts Provide Roofing

Almost by habit the SeaBees turned to their housing unit of a hundred uses, the stran-steel arch-rib quonset hut. By increasing wall height only 3 ft., it was possible to roof the entire engine room with parts from a standard 40 x 100-ft. warehouse type hut, and to cover the pump room with parts from two 20 x 56-ft. personnel type huts. On the latter structure, the 20-ft. span arches were opened at the crown to admit horizontal 2 x 4 wood spreaders which increased the arches to the 24-ft. width required to span the pump room. Thus the entire building was brought to usable completion at only a fraction of the cost in time and materials which the original bombproof design would have required. And since Guam has not been bombed by the Japs since their abortive conquest back in December of 1941, the bombproof features of the plant are not considered essential in the current war.

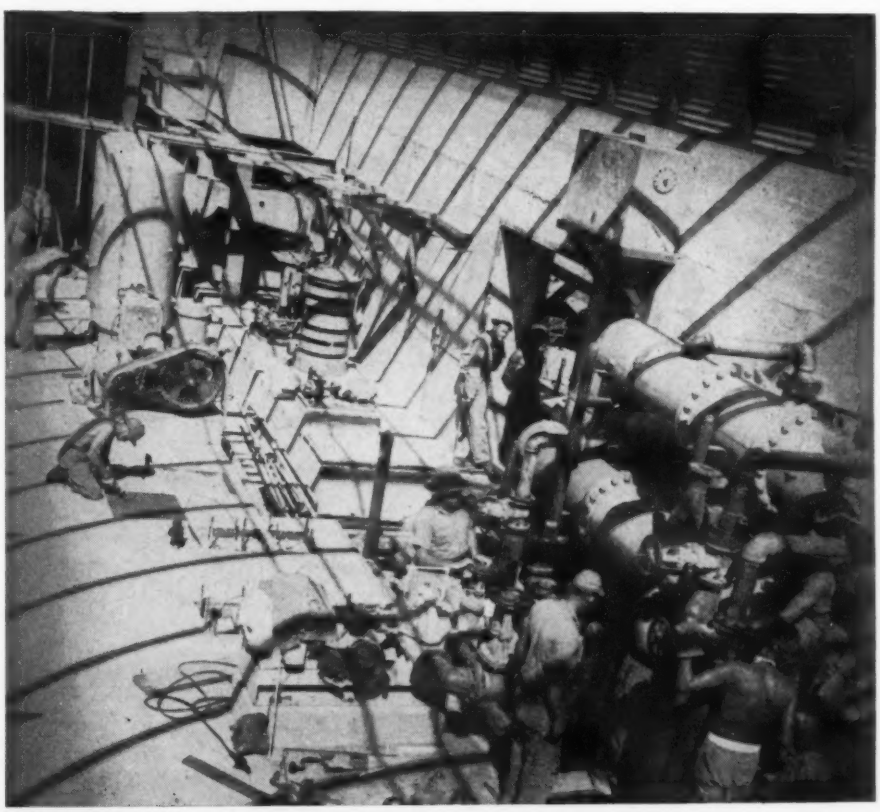
When approval was obtained releasing the two generating units from Pearl Harbor, plant-wise SeaBee engineers who were charged with the job of re-installing the equipment on Guam personally supervised its removal and shipment from Hawaii. Each piece was carefully packed, labeled, and stowed aboard an LST (landing ship, tank) and so efficiently was the job handled that not a piece or part was missing or damaged in transit.

Unloading the crated engines from the LST to a coral beach at Guam offered some problems, however. LST's are designed to disgorge mobile tanks, not stationary 45-ton diesel engines. Tank-deck quarters were close and cramped, headroom was low, lifting equipment was entirely absent, and the engines were big and awkward. Because the low overhead prohibited the use of rollers under the engine skids, it was necessary at one point in the operation to hook two heavy D-8 "cat" tractors in tandem on the beach and thus drag the engines forward along the LST deck by brute force. Once off the LST, the engines were skidded from the beach onto a 50-ton low-boy trailer and hauled direct to the plant site with no further serious difficulties. Here they were almost completely torn down for overhaul and general check-up by SeaBee diesel experts preparatory to their final installation.

Plant Completion Work

Original concrete work done on the plant structure had terminated with the base slab about 3 ft. below finished floor level. With the exception of the thick clusters of reinforcing steel protruding from the slab, no work had been done on the machine foundations. SeaBees picked up right where the contractors had been forced to leave off. They reopened the job by pouring reinforced concrete foundations not only for the two 500-kw. machines but for the two new 700-kw. machines being ordered to bring the plant up to full capacity. As completed, the foundations were 4 ft. thick, rigidly bonded by reinforcing steel to the original 3-ft.-thick base slab to form an effective foundation depth of 4 ft. plus 3 ft., or 7 ft. The entire building, including the walls, base slab and machine foundations, thus forms a single mass of heavily reinforced concrete, and as such would be highly resistant to shock waves resulting from earthquakes or nearby bomb blasts.

Machine installation went smoothly despite the large weights involved and the lack of some special tools common to less isolated jobs. The foresighted SeaBees installed the 20-ton overhead traveling crane as a top-priority item



Pump room showing heat exchanger installation. Zebra-shadow pattern caused by open ribs of unroofed quonset hut

so that when they were ready to ease the big engines down onto their foundation bolts, they were able to lower them, one end at a time, by means of the overhead crane. Under the knowledgeable guidance of a SeaBee chief machinist's mate with a lifetime of civilian millwright experience behind him, both machines were set, checked, shimmed, and brought into perfect alignment in less than six days per machine. As finally grouted in place, the engines show less than a thousandth of an inch of deflection between throws on the crankshafts.

The overhead crane, like the two 500-kw. units, had also been originally built for Guam and later diverted to Pearl Harbor. Because the Hawaiian plant was installed in a long narrow tunnel, it was necessary to cut down the span of the crane beams from 38 ft. to 27 ft. So when the crane was reinstalled in the Piti plant at Guam, it was of course 11 ft. too short to span the entire engine room. Accordingly, the crane rails were installed on two horizontal I-beams supported on two rows of 10-in. H-columns. This construction resulted in a row of H-columns through the engine room area. However, these columns have not proved objectionable, considering the valuable time saved by using the available crane structure.

The crane served not only in engine installation, but in roof span erection as well. Instead of building an elaborate fixed scaffold system for the construction of the arched-rib roof, the SeaBees simply built one narrow scaffold atop the beams of the traveling crane. Then, by rolling the crane along its track from one end of the engine room to the other, it was possible to erect all the 40-ft. roof arches with the one traveling crane.

Plant piping proved to be one of the most difficult phases of the work because of an acute shortage of every type of pipe fitting needed to complete the job. With characteristic self-sufficiency, SeaBee welders field-fabricated bends, tees, reducers, pipe saddles, and virtually everything else that was needed and otherwise unobtainable. The resulting piping layout, while not as eye-appealing as its counterpart in the States is still a fine workmanlike job and a tribute to SeaBee skill and can-do ability.

Recycled River Cooling

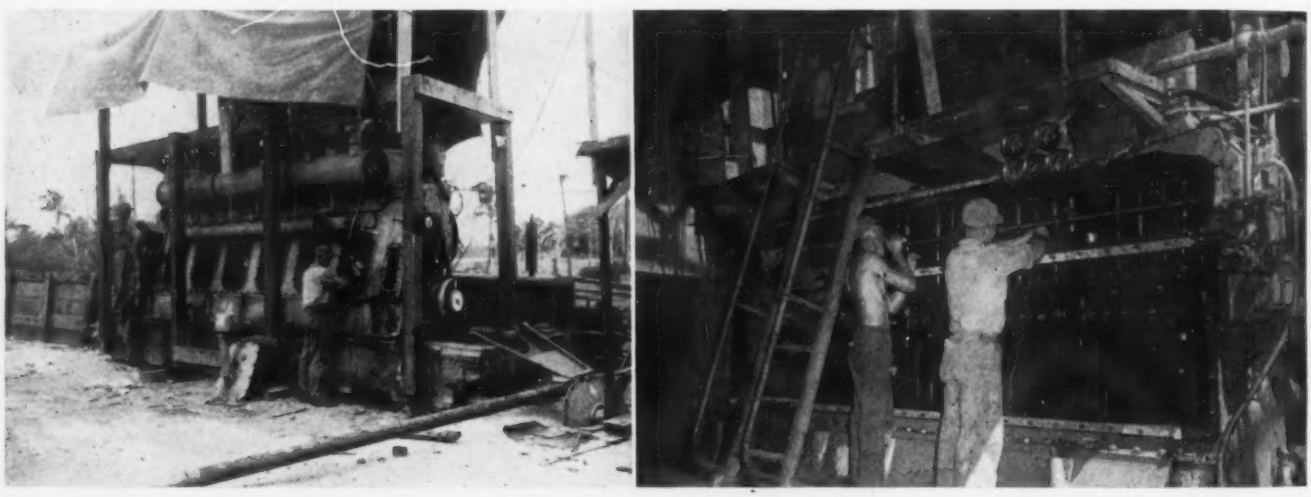
A reliable source of cooling water offered another problem until it was found that a nearby stream, ambitiously titled "Aguada River," could be pressed into service as both a water supply and a cooling pond. Original plans had called for a horizontal 18-in. concrete pipe running at a minus 3-ft. elevation from a well sunk in the pump room floor, outboard to the deep water of Apra Inner Harbor, a distance of about 1,000 ft. Installation of this sub-sea-level line would have required costly trenching operations and submarine pipelaying, and would also have necessitated cutting through the sheet-pile bulkhead at the inner edge of the harbor.

To avoid all these difficulties, the SeaBees constructed a dam across the small seasonal stream which runs by the plant site, and used the fresh water from the little reservoir thus formed to circulate through the engine heat exchangers. The hot discharge water from the exchangers they dumped back into the Aguada River stream bed at a point about 500 yd. above the dam. Here the 1,000-g.p.m. hot water flow from the heat exchangers mingles with the 50- to 60-g.p.m. from the little stream in the long narrow reservoir formed by the dam. By the time it has passed downstream the 500 yd. to the dam, it has cooled sufficiently to permit its being recycled through the heat exchangers. Make-up water and some flushing is provided by the 50- or 60-g.p.m. of fresh water which flows in the Aguada River at all times.

This typically SeaBee cooling system which recycles the water of a small island stream is admittedly somewhat temporary in nature. Ultimate plans call for a cooling tower to replace the cooling pond now formed by the dam and reservoir. In the meantime, however, the plant is going on the line and the engine heat exchangers are being furnished their proper quotas of cool water. Moreover, by using fresh stream water rather than sea water, all the troublesome maintenance problems of pipe-line mussel growth and salt-water corrosion are being avoided.

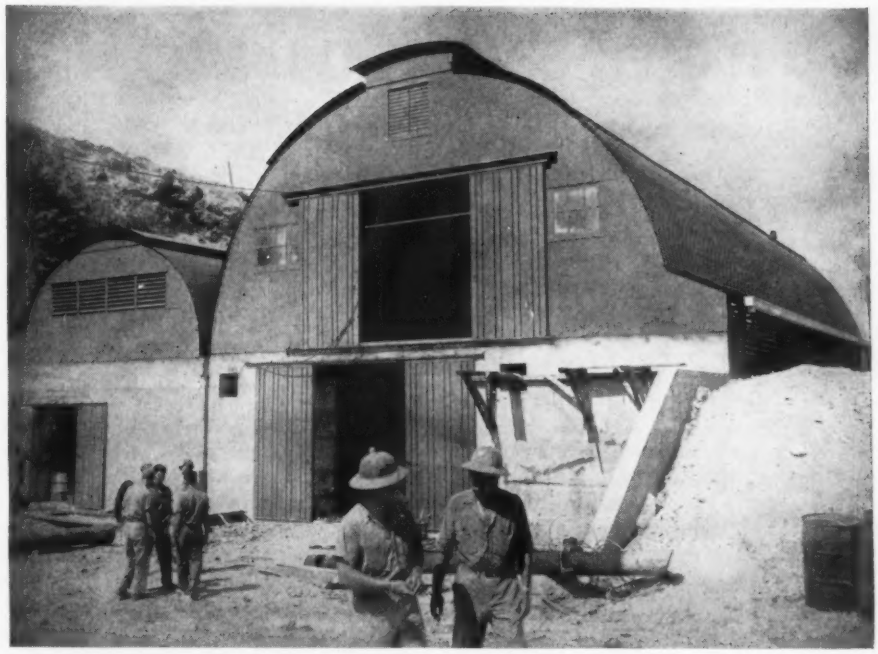
In providing soft water for make-up in the engine cooling jackets, SeaBees followed the local native custom of catching and storing rainwater in a cistern. Following this system, rainwater from the frequent island showers flows by gravity from the building roof gutters to a small cistern, from which it is pumped into three 5,000-gal. wood storage tanks located on a nearby hillside. From this elevated point, it flows by gravity to provide jacket make-up water at the engines. The plant piping is so arranged as to permit use of this stored water for direct engine cooling in emergencies. Wasting the heated water overboard, the 15,000 gal. in the three tanks will allow from one-half to one hour of emergency operation.

The plant fuel-oil supply was made easy by the existence on a nearby hillside of a large diesel-oil tank farm. Oil from these tanks is fed by gravity through a 2½-in. line to a 1,000-bbl. plant storage tank located on a hill just behind the building from where it feeds, also by gravity, into the 1,200-gal. engine day tank. By the fortunate elevated location of the oil supplies, all flow is by gravity and no pumps are required.



One of the 500-kw. diesels as it arrived from Hawaii (left), being given pre-installation checkup. Right—Engine is receiving final tune up after installation

Guam diesel-electric plant nears completion after four years of adversity. Quonset hut roof replaces original prewar heavy concrete bombproof design



Jungle Rust and Mold

In reviewing the job, SeaBee engineers agreed that one of the toughest problems connected with plant construction and operation in the tropics is the constant threat of damage by rust, corrosion, moisture and mold. Heat and humidity combine to turn bright clean steel into rusty junk in short order unless vigorous protective measures are taken. Jungle mold by growing in the pores of insulating tape can quickly destroy the best electrical insulation unless adequate air circulation is maintained to prevent formation of this damaging fungus. Throughout the shipping and installation of the plant equipment, all exposed metal parts on the engines had to be repeatedly greased to prevent corrosion and crates had to be vented to check mold formation.

So penetrating is this tropical humidity that when dielectric strength of first-class insulations in the newly installed generator armatures were first tested, they "megged" only one-half megohm. After 48 hours of drying, using full armature current on weak-field, short-circuited operation, the readings climbed to about four megohms. After four hours of cooling and further drying, the readings went up to 50 megohms. This was the top value for insulation in a jungle location unit —there are no infinity "megger" readings in the tropics. After two or three days during which the machines stood idle, the "megger" readings fell off to about two megohms, and they continued to drop until the machines were dried out through actual operation under load. Because of the all-prevailing moisture, it has been found advisable to operate generators at least once in every three days in order to keep insulation strength up within safe values.

Completed Plant Layout

As presently completed, the Piti power plant consists of two 500-kw. diesel engine generators with provision for two more 700-kw. units in the immediate future. Engines are by Worthington; generators and metal-clad switchgear are by General Electric. The present 500-kw. machines, because they were rewound for use at Pearl Harbor, operate at 2,300-volts wye. The two new 700-kw. units, to conform with the recently established island distribution voltage, will generate at 4,160-volts wye. These two plant voltages will be handled on two separate metal-clad buses, tied together through bus-tie breakers and a 1,200-kva. bank of transformers. Plant power feeds from the 2,300-volt bus through a 200-kva. load center bank of non-flammable transformers and set of metal-clad air breakers to the various plant loads. Outside distribution feeders will radiate from the 4,160-volt feeder breakers, and the 13.8-kv. tie line which connects this plant with several others being built on the island will also tie into the 4,160-volt bus through breakers and transformers. Final plant capacity will be 1,000 plus 1,400 or 2,400 kw., the major portion of which will be consumed by the fast growing fleet-service facilities on nearby Inner Harbor.

So, despite the long delays and terrible losses in manpower and material, the Piti power plant is at last going on the line to deliver its full quota of war supporting kilowatts in the fight against the Japs—a tribute to Guam's brigade commander, Commodore W. O. Hiltabidle, (CEC), USN, and the SeaBee forces he directs. Only grim note in the happy completion ceremony is the sober knowledge that the first crew of Americans who set out to build this plant are now wasting away in the prison camps of Kobe or sweating it out in Jap labor battalions—a stern fact that has served to spur the SeaBees on to greater efforts. Editor's Note: We hope that, with the war at an end, these American prisoners will be among those early released and will all be safely returned to their families.

Rainwater runoff from roof is stored in three 5,000-gal. wood tanks for engine jacket make-up water. 10,000-bbl. steel tank in rear provides plant fuel storage. Flow is by gravity from elevated tanks

Longview House Heating Data

Tests on 60 space heating installations yield valuable information on load characteristics. Post card survey indicates 25% of residential customers want electric house heating postwar

Harry G. Kelsey

Manager Cowlitz PUD, Longview, Wash.

DURING the past three years considerable data have been accumulated on 60 electric space heating installations in Longview, Wash., which may be helpful to others interested in electric house heating. During 1941, through the initiative of our then sales representative, Fred Boody, and with the cooperation of one of our local contractors, Jesse Jones, the first installations of electric space heating were made.

To date 60 installations are being served. In addition, a single-story office building being constructed for two doctors will be heated electrically and a two-story building is being remodeled into 30 apartments each of which will be electrically heated. Selection of electric heating for the office and apartments was made without promotional effort on our part, indicating a definite customer desire for this class of service.

During the past spring, in cooperation with Bonneville Power Administration, return post cards were mailed to 5,000 residence customers asking them to check the major appliances they were now using and the ones they desired to purchase when available. The purpose of this post card survey was to get an indication of possible postwar load building activities upon which to base our plans for expanding our system facilities. Replies from 1,788, or approximately 36% of our customers, were received. Of these replies 445 customers or 25% indicated their desire for electric heating in their homes. What percentage of these folks will follow through with their desires is anybody's guess but it is indicative of a potential market for this type of service.

In order to lay a proper background for the data to be presented, some information will be given on type of building construction, insulation, wiring costs and method of applying the electric heat.

Building Construction—All heating installations except two were made in homes while under construction. Regular standard frame wall construction was used comprising 2 x 4 studding, sheathed on the outside with shiplap covered with building paper and siding or shingles and wood lath and plaster inside covering.

Insulation—All exterior walls and upper ceilings were insulated between studding with 4 in. of Palco wool, one of many types of insulating materials available. The average cost of insulating the home was approximately $100. Felt paper was installed between the sub floor and finished floor. Some of these homes are 1½-story or full two-story, in which case felt paper was used only in the lower floor. All exterior doors and windows were weather stripped using metal interlocking weather strip. Use of Thermopane glass after the war may eliminate the need for weather stripping the windows.

Wiring—Heating outlets were wired for 230-volt service. The average cost per outlet varied from $10 to $12.50. Heaters were recessed in the walls for flush mounting. Outlet costs include a proportionate share of the main service entrance distribution facilities. All electric service to the residence is supplied through one self-contained socket type meter.

Heaters—Wesix wall type heaters were installed in each room, each heater thermostatically controlled. This is very important to the utility to obtain the greatest diversity of demand as will be discussed later. The heater cost averaged $18 per kilowatt. Houses vary in size from 5,032 to 17,664 cu. ft., therefore the connected heating load also varies from 6 kw. to 31 kw. In general, it averages about two watts per cubic foot. Proper location of heaters is very important to secure desirable air circulation in each room and satisfactory heating results.

Table I—Average Annual Kwh. Consumption, Revenue and Unit Costs and Energy Consumption Per Cubic Foot of Electric Space Heating Installation

For Calendar Years 1943 and 1944

Description (space heating only)	Years 1943	Years 1944
39 Individual residences:		
Average annual kwh. consumption per residence	10,470 kwh.	10,463 kwh.
Average annual revenue per residence	$ 71.28	$ 68.59
Average annual revenue per kwh.	6.81 mills	6.55 mills
Average annual kwh. per cu. ft. of house	1.27 kwh.	1.27 kwh.
Average annual cost to customer per cu. ft. of house	8.7 mills	8.3 mills
Average connected heating load per house	15.5 kw.	15.5 kw.
4 Duplex residences (8 living units)		
Average annual kwh. consumption per living unit	6,920 kwh.	7,644 kwh.
Average annual revenue per living unit	$ 42.77	$ 46.35
Average annual revenue per kwh.	6.18 mills	6.06 mills
Average annual kwh. per cu. ft. of living unit	1.21 kwh.	1.33 kwh.
Average annual cost to customer per cu. ft. of living unit	7.5 mills	8.1 mills
Average connected heating load per living unit	12 kw.	12 kw.
7 Motel cabin apartments		
Average annual kwh. consumption per apartment	5,989 kwh.	5,143 kwh.
Average annual revenue per apartment	$ 34.64	$ 27.80
Average annual revenue per kwh.	5.78 mills	5.40 mills
Average annual kwh. per cu. ft. of apartment	1.83 kwh.	1.57 kwh.
Average annual cost to customer per cu. ft. of apartment	10.6 mills	8.5 mills
Average connected heating load per living unit	6 kw.	6 kw.
Degree days for each year	5,138	4,996

Operating Data

For the years 1943 and 1944 the monthly kwh. consumption and revenue from these electrically heated homes has been tabulated. Electric service to each home for all uses is supplied through one meter at the following all-electric rate:

First 300 kwh. or less per month $4.50 (minimum charge)
Next 900 kwh. per month at ½c per kwh.
All over 1,200 kwh. per month at ¾c per kwh.
(Billings under the above rate are subject to a 3% city excise tax)

These tabulations are segregated to cover individual residences, duplex residences and motel cabin apartments.

Table II

Public Utility District No. 1, Cowlitz County, Wash., Analysis of Electric Heating for 39 Homes, Year 1944, Longview, Wash.

	Weather Strip	Insulation	No. of Rooms (1)	Cubic Feet (2)	Connected Heating Load Kw. (3)	Total Electric Service Kwh. (4)	Total Electric Service Billing (4)	Total Electric Service July-Aug.-Sept. Kwh. (5)	Total Electric Service July-Aug.-Sept. Billing (5)	Balance Chargeable to Electric Heat (Col. 4 —4 x Col. 5) Kwh. (6)	Balance Chargeable to Electric Heat Billing (6)	Elec. Heat Kwh. per Cu. Ft. (7)	Avg. Annual Cost per Cu. Ft. (8)	
1.	D & W	W & C	5	5,700	9	15,238	$ 125.14	1,642	$ 17.74	8,670	$ 54.18	1.52	.95c	
2.	D & W	W & C	6	7,632	15.5	18,940	151.04	2,053	19.85	10,728	71.64	1.41	.94c	
3.	D & W	W & C	5	5,816	12.5	16,793	135.52	1,768	18.39	9,721	61.96	1.67	1.07c	
4.	D & W	W & C	6	9,980	30	22,036	175.75	1,738	18.23	15,084	102.83	1.51	1.03c	
5.	D & W	C	6	8,000	17	17,654	144.88	1,064	14.97	13,398	85.00	1.67	1.06c	
6.	D & W	W & C	7	9,512	18	19,018	132.40	1,638	17.72	12,466	61.52	1.31	.65c	
7.	D & W	W & C	6	10,500	21	23,175	185.87	1,210	15.62	18,335	123.39	1.75	1.18c	
8.	D & W	W & C	3	4,032	6	12,126	103.07	1,703	18.05	5,314	30.87	1.32	.77c	
9.	D & W	W & C	6	9,216	9	14,292	122.68	1,031	14.64	10,168	64.12	1.10	.70c	
10.	D & W	W & C	6	8,000	17.5	11,318	99.79	1,021	14.79	7,234	40.63	.90	.51c	
11.	D & W	W & C	5	9,200	10	19,686	158.06	1,490	16.95	13,726	90.26	1.49	.98c	
12.	D & W	W & C	5	6,900	15	14,316	126.25	1,328	16.12	9,004	61.77	1.30	.90c	
13.	D & W	W & C	6	9,672	11.5	20,629	164.09	2,406	21.67	11,005	77.41	1.14	.80c	
14.	D & W	W & C	5	6,680	10.5	17,930	146.64	1,871	20.43	10,446	64.92	1.56	.97c	
15.	D & W	C	5	7,200	12	21,002	165.47	2,866	24.41	9,538	67.83	1.32	.94c	
16.	D & W	W & C	7	8,832	20	22,541	170.36	2,831	23.87	11,217	74.88	1.27	.85c	
17.	D & W	W & C	6	7,200	15.5	16,165	133.42	1,795	18.52	8,985	59.34	1.25	.82c	
18.	D & W	W & C	7	11,888	20	21,379	170.23	2,472	22.01	11,491	82.19	.97	.69c	
19.	D & W	W & C	5	7,544	17	20,194	158.82	2,821	23.81	8,910	63.58	1.18	.84c	
20.	D & W	W & C	6	8,100	16	17,500	141.10	1,830	18.70	10,180	66.30	1.26	.82c	
21.	D & W	W & C	5	6,908	15.5	14,434	118.64	1,853	18.82	7,022	43.36	1.02	.63c	
22.	D & W	W & C	5	7,000	15	13,921	118.12	1,048	14.96	9,729	58.28	1.39	.83c	
23.	D & W	W & C	7	9,600	20	24,664	195.24	3,361	28.76	11,220	80.20	1.17	.84c	
24.	D & W	W & C	6	9,698	16.5	21,288	169.84	1,930	19.21	13,568	93.00	1.40	.96c	
25.	D & W	W & C	5	7,824	19	14,755	122.98	1,143	15.53	10,183	60.86	1.30	.78c	
26.	D & W	W & C	6	8,320	15	21,681	170.97	2,607	22.92	11,253	79.29	1.35	.95c	
27.	D & W	W & C	7	13,000	20	21,741	175.00	1,605	17.90	15,321	103.40	1.18	.80c	
28.	D & W	W & C	6	9,800	19.5	11,801	100.37	1,826	18.68	4,497	25.65	.46	.26c	
29.	D & W	W & C	5	9,160	16.5	10,595	95.79	953	14.69	6,783	37.03	.74	.40c	
30.	D & W	W & C	6	6,480	15.5	21,232	168.80	2,109	20.14	12,796	88.24	1.97	1.36c	
31.	D & W	W & C	5	6,780	14	16,185	130.60	1,849	18.81	8,789	55.36	1.30	.82c	
32.	D & W	W & C	5	6,880	15	21,355	167.00	3,067	25.37	9,087	65.52	1.32	.95c	
33.	D & W	W & C	5	6,528	11	20,095	158.61	2,609	22.71	9,659	67.77	1.48	1.04c	
34.	D & W	W & C	5	6,900	9	17,975	143.01	2,327	21.25	8,667	58.01	1.26	.84c	
35.	D & W	W & C	5	7,167	15	18,557	146.53	2,098	20.08	10,165	66.21	1.42	.92c	
36.	D & W	W & C	5	5,104	11	13,065	108.25	1,428	16.64	7,353	41.69	1.44	.82c	
37.	D & W	W & C	5	6,400	12	18,755	148.89	2,656	22.95	8,131	57.09	1.27	.89c	
38.*	D	C	4	7,168	12	28,703	230.39	2,251	20.88	19,699	146.87	2.75	2.05c	
39.	D & W	W & C	II	17,664	31	19,075	168.71	327	11.96	17,767	120.87	1.01	.68c	
Total					593.5	683,106	$5,517.93	71,374	$727.87	397,610	$2,606.45			c
Average			6	8,232	15.5	17,976	145.21	1,878	19.15	10,463	68.59	1.27	.83c	

* No. 38 is a small retail store and does not represent residential heating conditions. Consequently it is not included in the totals and averages given above.

Analysis of Electric Heating for Four Duplex Residences, Year 1944

	Weather Strip	Insulation	No. of Rooms (1)	Cubic Feet (2)	Connected Heating Load Kw. (3)	Total Electric Service Kwh. (4)	Total Electric Service Billing (4)	Total Electric Service July-Aug.-Sept. Kwh. (5)	Total Electric Service July-Aug.-Sept. Billing (5)	Balance Chargeable to Electric Heat Col. 4 —4 x Col. 5) Kwh. (6)	Balance Chargeable to Electric Heat Billing (6)	Elec. Heat Kwh. per Cu. Ft. (7)	Avg. Annual Cost per Cu. Ft. (8)	
1.	D & W	C	3	2,856	9.5	12,665	$ 108.63	1,092	$ 14.90	8,297	$ 49.03	2.91	1.72c	
	D & W	C	3	2,856	9.5	13,131	110.92	1,595	18.10	6,751	38.52	2.36	1.35c	
2.	D & W	C	7	7,560	14.5	13,909	118.52	964	14.66	10,053	59.88	1.33	.79c	
	D & W	C	7	7,560	14.5	15,849	132.87	1,410	16.53	10,209	66.75	1.35	.88c	
3.	D & W	C	5	7,728	16	13,117	112.11	1,246	15.69	8,133	49.35	1.05	.64c	
	D & W	C	5	7,728	16	14,531	118.44	2,022	19.69	6,443	39.68	.83	.51c	
4.	D & W	C	4	5,200	6.5	11,009	96.71	1,307	15.18	5,781	35.99	1.11	.69c	
	D & W	C	3	4,384	6.5	10,276	93.32	1,197	15.44	5,488	31.56	1.25	.72c	
Total						104,487	$ 891.52	10,833	$130.19	61,155	$370.76			c c
Average				5,734	12	13,061	$ 111.44	1,354	$ 16.27	7,644	$ 46.35	1.33	.81c	

Analysis of Electric Heating for Seven Motel Cabin Apartments, Year 1944

1.	D & W	W & C	3	3,200	6	11,635	$ 99.59	1,643	$ 17.74	5,063	$ 28.63	1.58	.89c	
2.	D & W	W & C	3	3,200	6	8,913	84.13	1,048	15.31	4,721	22.89	1.48	.72c	
3.	D & W	W & C	3	3,200	6	9,709	88.60	1,035	14.61	5,569	30.16	1.74	.94c	
4.	D & W	W & C	3	3,680	6	10,947	95.58	1,259	15.76	5,911	32.54	1.61	.88c	
5.	D & W	W & C	3	3,200	6	10,175	91.11	1,278	16.08	5,063	26.79	1.58	.84c	
6.	D & W	W & C	3	3,200	6	10,980	95.20	1,494	16.97	5,004	27.32	1.56	.85c	
7.	D & W	W & C	3	3,200	6	11,645	99.30	1,744	18.25	4,669	26.30	1.46	.82c	
Total						74,004	$ 653.51	9,501	$114.72	36,000	$194.63			c c
Average				3,269	6	10,572	$ 93.36	1,357	$ 16.39	5,143	$ 27.80	1.57	.85c	

Notes: D & W = Doors and windows, weather stripped.
W & C = Walls and ceilings, insulated.
C = Ceiling insulation only.

* 3% city license tax included in the above cost figures.

All-electric Home Rate—Schedule A-3

First 300 kwh. or less per month, $4.50.
Next 900 kwh. per month at ½c per kwh.
All over 1,200 kwh. per month at ¾c per kwh.

The two-year results are summarized in Table I and detailed results for 1944 are shown in Table II. Each table is generally self-explanatory. Since all service is supplied through one meter, it was necessary to determine the energy used for heating purposes only. This was done on the basis of the statement of the U. S. Weather Bureau that only 1% of the fuel consumption for heating a home during the entire year is used during the three-month period of July, August and September. On this assumption four times the kwh. consumption and billing for that three-month period was considered as the annual energy consumption and revenue from lighting, cooking, water heating and other miscellaneous uses and subtracted from the annual consumption and billing, and the remainder considered as kwh. consumption and billing for electric space heating.

All homes equipped with electric heating have at all times maintained satisfactory temperatures and have been more than adequate to meet all requirements. Minimum outdoor temperatures of 10° F. have been experienced.

Load Characteristics

The load characteristics of space heating are very important to the utility supplying service. In one subdivision comprising 76 homes, 17 are electrically heated which results in a 22% saturation of heating installations. In this subdivision there is one primary lateral serving ten homes, of which seven are electrically heated, or a 70% saturation. Through the cooperation of Bonneville Power Administration, we were able to secure and install a number of 30-minute graphic demand meters to determine the load characteristics of individual homes, equivalent demand at the transformer serving 70% saturation of electric heating and the equivalent demand on a feeder serving 22% saturation. From these data have been developed charts to show the results and load characteristics of this class of service.

The middle curve of Fig. 1 shows the maximum daily 30-minute demand of 76 houses on a feeder having 91% saturation of electric ranges and storage type water heaters and 22% saturation of electric space heating. The lower curve shows the degree-days. The period covered is from July 1, 1944 to June 30, 1945. Notice how the demand curve follows the degree-day curve quite consistently although during January 1945, while the degree-day curve reached the same peaks as were attained during December 1944, the demand curve did not reach the December peak. Subsequent charts show the relation between the morning and evening heating peaks and the cooking and water heating peaks. The maximum feeder demand occurred on Friday, Dec. 15, between 7:30 and 8:00 a.m. on a 34 degree-day. The demand per customer at that time averaged 3.16 kw., which includes lighting, refrigeration, cooking, water heating, space heating and miscellaneous use. That gives some idea of what to expect in planning for expanded distribution systems. Dec. 17, Jan. 25 and 30 were 35 degree-days but the feeder peak did not quite reach its previous maximum.

The lower curve of Fig. 1. shows the maximum daily 30-minute demand on a transformer serving ten homes, seven of which are electrically heated and having 100% saturation of electric ranges and storage type water heaters. The lower curve shows degree-days. The period covered is also from July 1, 1944 to June 30, 1945. Notice that the peak demand occurred also on Friday, December 15, between 7:30 and 8:00 a.m. The total peak being 69 kw. or 6.9 kw. per customer, which includes lighting, refrigeration, cooking, water heating, space heating and miscellaneous use. Compared with the middle curve of Fig. 1, the peak demand

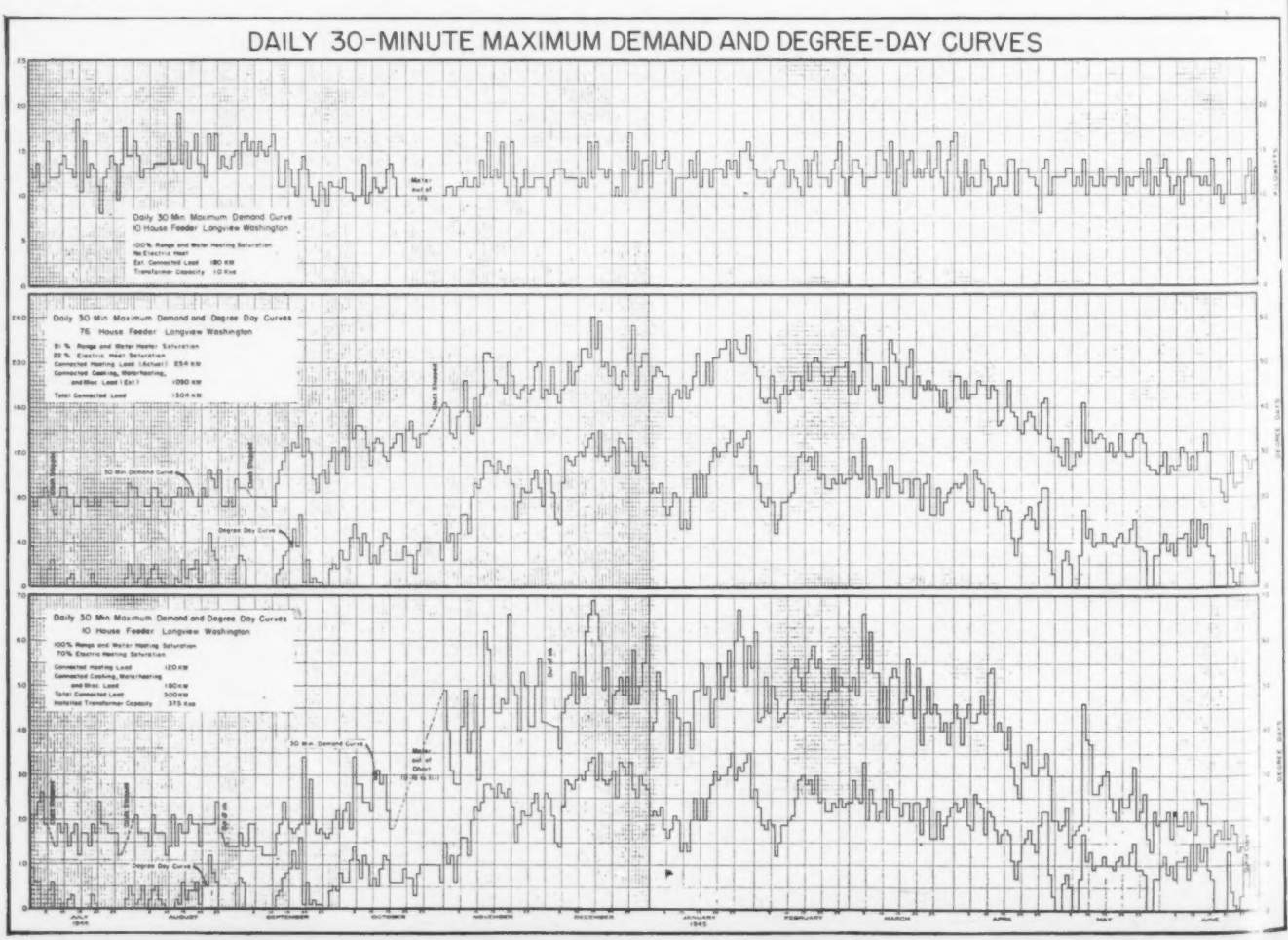


Fig. 1. Daily 30-minute demand data

per customer increased from 3.16 kw. at 22% saturation to 6.9 kw. at 70% saturation of heating. While the increased demand was substantial, it was not directly proportional to the increase in saturation. Incidentally, 69 kw. is quite a load for a 37½-kva. transformer and subsequent charts show that the overload on the transformer lasted over quite a period of hours, yet the temperature as indicated by the chart readings from a thermocouple immersed in the oil did not indicate excessive overheating.

The upper curve of Fig. 1 shows the maximum daily 30-minute demands on a transformer serving ten homes with 100% saturation of cooking and water heating but zero saturation of space heating. It is interesting to note that the maximum demand on Friday, Dec. 15, was only 12 kw. or 1.2 kw. per customer, and occurred between 5:30 and 6:00 p.m., which is customary for this class of service. It is further interesting to note that the peak demand on the transformer during the period under observation occurred on Aug. 14, 1944, or in the summer time, probably due to the water heating load. The maximum winter peak occurred on Dec. 26 from 5:30 to 6:00 p.m. with a magnitude of 17 kw., or 1.7 kw. per customer. These demands cover lighting, refrigeration, cooking, water heating and miscellaneous use only.

From these three charts we might draw the conclusion that without electric heat the maximum winter demand per customer would be in the neighborhood of 1.7 kw. and would occur in the evening. With a 22% saturation of space heating, the customer demand on the system would increase to about 3.2 kw. and probably would occur in the morning. Increasing the space heating saturation to 70% would increase the customer demand to 7 kw., which also would occur in the morning although subsequent charts show a possibility of this demand occurring in the evening.

The series of daily load charts designated A, B and C are developed from the installation of a graphic demand meter installed on the primary side of the 37½-kva. transformer serving ten homes, seven of which are electrically heated. The sloping curves on each chart show the transformer temperature in degrees centigrade obtained from a thermocouple immersed in the oil near the top of the windings. In addition, separate demand meters were installed to measure the heating load for each residence. Each series of charts covers one week from Sunday to Saturday both inclusive.

Chart series A shows the one-half-hour demand each day resulting from the heating load of these seven homes. The week selected was from March 4 to 10 inclusive. The total heating demand was obtained by adding the simultaneous half-hour demands indicated by the graphic demand meters installed on each space heating load of the seven homes. On Sunday, March 4, the maximum demand from these heating loads totaled 34 kw. and occurred between 10 and 10:30 a.m. Sunday is an unusual day compared with other week days because family living habits are entirely different. It is interesting to note that the daily load factor on Sunday was 40.7%.

On Monday, March 5, the maximum heating demand of the seven houses totaled 46½ kw. and occurred between 7:30 and 8:00 a.m. Notice also the evening heating peak of 41 kw. between 5:00 and 5:30 p.m. Daily load factor of the heating load for Monday was 41%.

On Tuesday the maximum heating load totaled 40 kw. and occurred between 7:00 and 7:30 a.m., though the demand for the preceding one-half hour was 39 kw. The evening peak from heating was lower than the previous day and occurred between 6:00 and 6:30 p.m. amounting to 21½ kw. The daily heating load factor was only 33%. Tuesday, March 6, was only a 20 degree-day, whereas Monday was a 32 degree-day and Sunday a 24 degree-day.

Wednesday, a 27 degree-day, shows the heating peak between 4:30 and 5:00 p.m. with a magnitude of 38 kw. The morning peak of 36 kw. still occurred between 6:30 and 7:00 a.m. Daily heating load factor was 46.2%.

Thursday, March 8, was a 24 degree-day and the morning peak of 34 kw. occurred between 7:00 and 7:30 a.m. with a daily heating load factor of 44.4%.

Friday, March 9, was a 20 degree-day similar to Tuesday, however, the morning heating peak occurring between 6:30 and 7:00 a.m. was only 31 kw. compared with 40 kw. on Tuesday. The daily heating load factor, however, was exceptionally high, amounting to 51.1%.

Saturday, March 10, was a 22 degree-day with the heating demand of 27 kw. occurring between 7:00 and 7:30 a.m. with almost the same value again occurring from 8:30 to 9:00 a.m. and again from 9:00 to 9:30 a.m., with a high daily load factor of 50.5%. The weekly heating load factor totaled only 33.2%.

Reviewing curves marked series A, it is important to note that the heating peak usually occurs during the early morning hours but that it does have a definite afternoon peak which, on many days, coincides with the afternoon peak of cooking, water heating and lighting service.

Chart series B shows the total one-half-hour demands at the transformer of the ten homes and the demands of these ten homes resulting from lighting, cooking and water heating service only. The upper curves of each chart of series B show the total demand at the transformer including space heating load, and the lower curve shows the simultaneous demand at the transformer from lighting, cooking and water heating service only. The lower curve was developed by subtracting the simultaneous demand of the seven space heating installations from the total demand at the transformer, as indicated from the installation of a graphic demand meter.

On Sunday, March 4, the daily peak demand was 56 kw. and occurred between 8:30 and 9:00 a.m. and was influenced largely by the heating load, although the lighting, cooking and water heating peak coincided in time. It is interesting to note that the daily load factor of the total load was 44½%, the daily load factor from lighting, cooking and water heating 45.3%, indicating that the space heating load decreased the total over-all load factor.

Monday, March 5, shows the daily peak demand of the ten homes occurring between 6:00 and 6:30 p.m., with a magnitude of 66 kw. The lower curve shows the normal evening peaks from lighting, cooking and water heating. The afternoon space heating peak from the previous curve A-2 seems to have been the determining influence on the total demand. It is quite possible that water heating was responsible to a large extent for the evening peak on the lower curve.

On Tuesday, March 6, the daily peak demand of 54 kw. occurred between 7:00 and 7:30 a.m. coinciding with the space heating peak. The afternoon peak was considerably lower.

On Wednesday, March 7, the daily peak demand of 63 kw. again occurred in the evening between 5:00 and 5:30 p.m. although the preceding one-half hour was almost of the same magnitude. Here again we have the space heating peak coinciding with the lighting, cooking and water heating peak.

On Thursday, March 8, we again have the daily peak demand between 5:30 and 6:00 p.m. totaling 53 kw. The same thing occurs on Friday, March 9, with an evening peak between 4:30 and 5:00 p.m. of 53 kw.

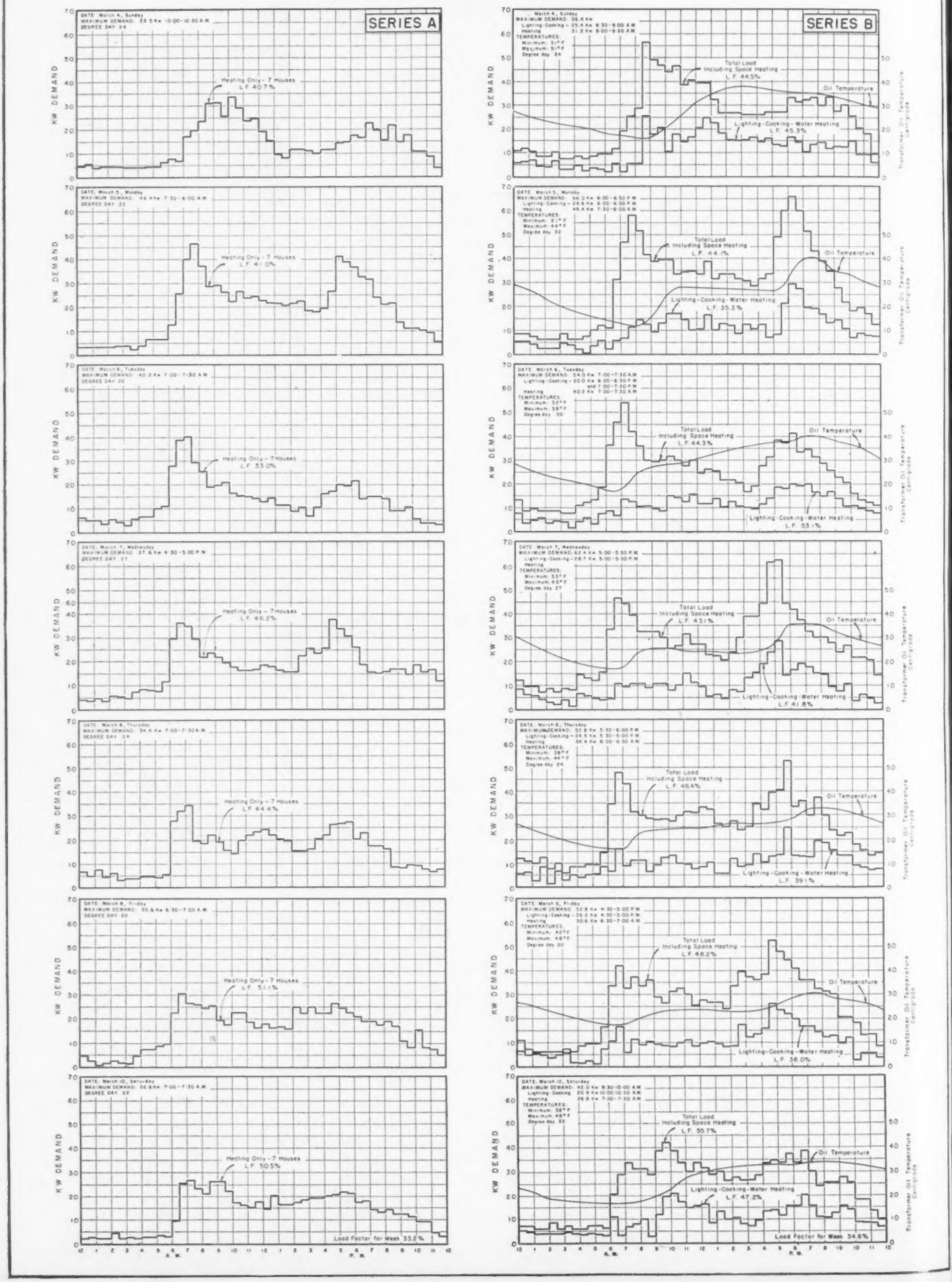
On Saturday, March 10, the daily peak demand of 42 kw. occurred in the morning between 9:30 and 10:00 a.m. It is interesting to note that the weekly load factor for lighting, cooking and water heating was 34.6% and for space heating 33.2% as shown on chart A-7.

The demand meters referred to were loaned by the Bonneville Power Administration and were available only from the latter part of February to the

PUBLIC UTILITY DISTRICT NO. 1 OF COWLITZ COUNTY

DAILY 30 MINUTE DEMAND AND TRANSFORMER TEMPERATURE CURVES

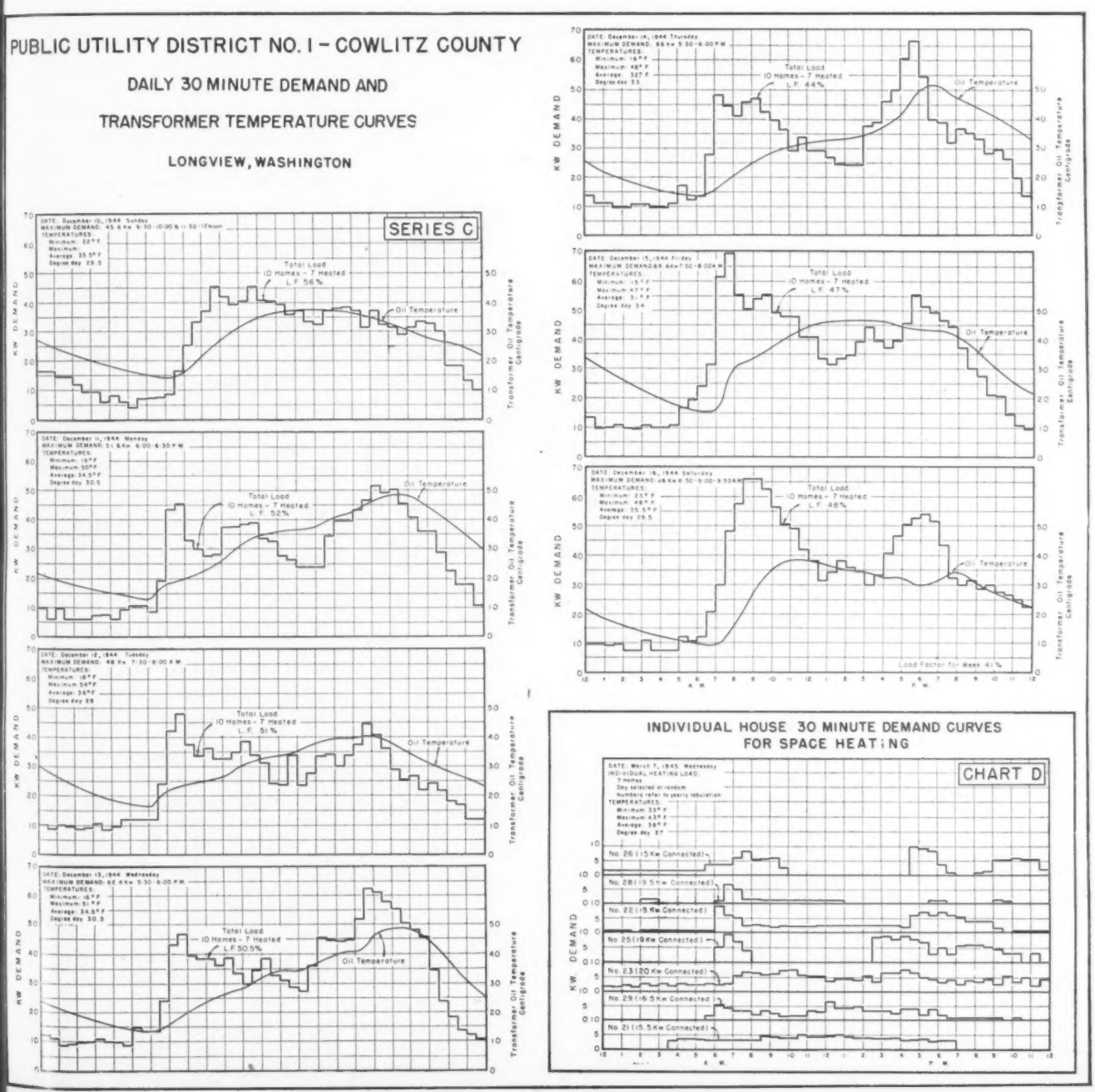
LONGVIEW, WASHINGTON



first part of April. The week of March 4 to 10 was selected to develop these charts as being a typical week during that part of the heating season. The demand meter on the transformer supplying service to these ten homes has been installed for almost two years and, therefore, in order to make a comparison of total transformer demand during the coldest part of the heating season, we develop chart series C covering the week of Dec. 10 to 16, both inclusive, 1944. This was the coldest week of the 1944-45 heating season. Generally speaking, the shape of the curves in series C is comparable with those in series B but the magnitudes of demand increase during the coldest weather. The maximum demand on the transformer occurred on Friday, Dec. 15, between 7:30 and 8:00 a.m. totaling 69 kw. on a 34 degree-day. The maximum transformer temperature of 51° C. occurred on Dec. 14, 1944 between 6:00 and 7:00 p.m. Dec. 14 was a 33 degree-day. The average ambient temperature on that day was therefore 32° F. or 0° C. Temperature rise in the transformer was within safe operating practice based upon design limits of 55° C. rise. Actually the ambient temperature at time of peak load was undoubtedly above the daily average temperature which would allow a greater factor of safety. Comparing the daily charts of series C with series B, it is interesting to note that on Sunday of both weeks the demand occurred during the morning. On Monday of both weeks the demand occurred in the evening. On Tuesday a morning demand in both instances. On Wednesday an evening demand in both instances, likewise on Thursday an evening demand, but on Friday during December the demand occurred during the morning compared with the afternoon of Friday, March 9. On Saturday the demand occurred in the morning of both days.

Chart D is developed to show the demand diversity, if any, between individual installations of space heating. Wednesday, March 7, was selected at random for this test. Analyzing this chart from top to bottom we find as follows. The numbers appearing at the left of each curve relate to the corresponding numbers of Table II previously discussed.

Installation No. 26 indicates that part of the space heating was an automatic control during the early morning


PUBLIC UTILITY DISTRICT NO. 1 - COWLITZ COUNTY
DAILY 30 MINUTE DEMAND AND
TRANSFORMER TEMPERATURE CURVES
LONGVIEW, WASHINGTON
SERIES C
KW DEMAND
Transformer Oil Temperature Centigrade
Total Load
10 Homes - 7 Heated
Oil Temperature
INDIVIDUAL HOUSE 30 MINUTE DEMAND CURVES
FOR SPACE HEATING
CHART D
KW. DEMAND
No. 26 (15 Kw Connected)
No. 28 (9.5 Kw Connected)
No. 22 (15 Kw Connected)
No. 25 (19 Kw Connected)
No. 23 (20 Kw Connected)
No. 29 (16.5 Kw Connected)
No. 21 (15.5 Kw Connected)

hours with constant load of 1½ kw. until 5:30 a.m. The morning heating peak for this customer totaled 8 kw. and occurred between 7:30 and 8:00 a.m. From 10:00 a.m. until 4:30 p.m. the heating load was off. At 4:30 p.m. a maximum peak of 10 kw. came on, indicating in all probability that the family had been away during the daytime, came home and turned on most of the heaters. After the house had been warmed the load dropped and from 7:00 to 8:00 p.m. was off entirely. The owner of this home is in the armed services and the home is being occupied by his wife, her mother and three children.

Installation No. 28 shows an entirely different picture. The family comprises a man, his wife and one child. The man works nights and gets home about 2:00 a.m. The curve indicates that perhaps he arrived home, turned on the heater in the kitchen, made a cup of coffee and read the paper before going to bed. The maximum daily demand of 6.5 kw. occurred between 6:30 and 7:00 a.m. then decreased to a uniform load of about 1 kw. until 1:00 p.m. The heating load was then off until 5:30 p.m. when again it was turned on for an hour, with a demand of about 1½ kw., and was then cut off until 9:00 p.m. where again it was only used for an hour and then cut off for the remainder of the night.

Installation No. 22 indicates that one unit, automatically controlled, was on alone until 6:00 a.m. at which time the heating load increased to 9 kw., decreasing thereafter and being maintained at about 3 kw. from 7:30 a.m. until 4:30 p.m. During the evening hours the demand was in the neighborhood of 7 kw., gradually tapering down until 9:00 p.m. at which time one heater was again left on automatic control.

Installation No. 25 shows no heating load until 6:00 a.m. at which time the house was warmed for a period of two hours reaching a maximum demand of almost 10 kw. This home is occupied by one person who works from 8:00 a.m. until 2:30 p.m. Upon returning home a demand of approximately 9 kw. was maintained for several hours, the heating load then tapering off during the balance of the evening.

Installation No. 23 was apparently operated on automatic control throughout the 24 hours with the thermostats set low during the early morning hours. This curve indicates a very desirable load factor. There are three people in the family occupying this home.

Installation No. 29 shows no heat used until 5:30 a.m., after which time the heat installation was perhaps operating automatically until about 10:30 p.m.

Installation No. 21 used no heat until 3:30 a.m. and apparently was operated until 7:00 p.m. on automatic control with a very even and constant demand.

Analyzing these curves it would appear that the diversity in heating demand between individual homes is controlled largely by the living habits and working schedules of the occupants. For a summation of these seven curves, refer to chart No. 4 of series A.

Conclusion

The important question in every distributor's mind is: "What is the cost of supplying service to space heating loads?" The answer to that question probably will be different for each distributor of electricity depending upon many factors. Any cost analysis of necessity must be based upon allocations and assumptions which in themselves are subject to discussion and argument. The following comments apply to the conditions existing in this area, although some may be applicable to other localities.

On our system, due to many influencing factors, we are in effect buying electricity for this type of load on a rate which at present does not exceed 2½ mills per kwh. The average annual resale rate for this service is about 6½ mills, leaving a 4-mill margin to cover other elements of cost. The average price received by us from the sale of electricity to all classes of service is only about 5½ mills per kwh. due to the large volume of industrial load. The average space heating rate is higher than the present over-all average price. We have been able to meet all of our operating costs including bond interest and amortization charges and believe we can continue to do so. However, it should be pointed out that at present we are serving only approximately 1% of our residential customers with electric heating.

Analyzing the additional investment in one primary and secondary line occasioned by serving seven electrically heated homes, we found this added investment to be $158 comprising the added cost of heavier secondary and service wires and transformer capacity. The additional annual revenue from these seven heating installations totaled $384.67, or a ratio of $2.43 of annual revenue per dollar of additional investment, which compares quite favorably with accepted practice of extending rural lines on a ratio of 20 cents annual revenue per dollar of added investment (5 to 1 investment ratio.)

These illustrations are not necessarily conclusive as to whether space heating can be served without loss to any distributor but the majority of retail rate structures in the Pacific Northwest are low enough to attract space heating and the desire on the part of our customers for this class of service is apparent. Consequently, it is of utmost importance that our energies should be devoted to seeing that proposed installations are correctly made to prevent dissatisfaction resulting from poorly designed equipment improperly installed. With respect to Cowlitz County PUD, it is our opinion that space heating load is carrying its full share of costs.

Maginot Mentality

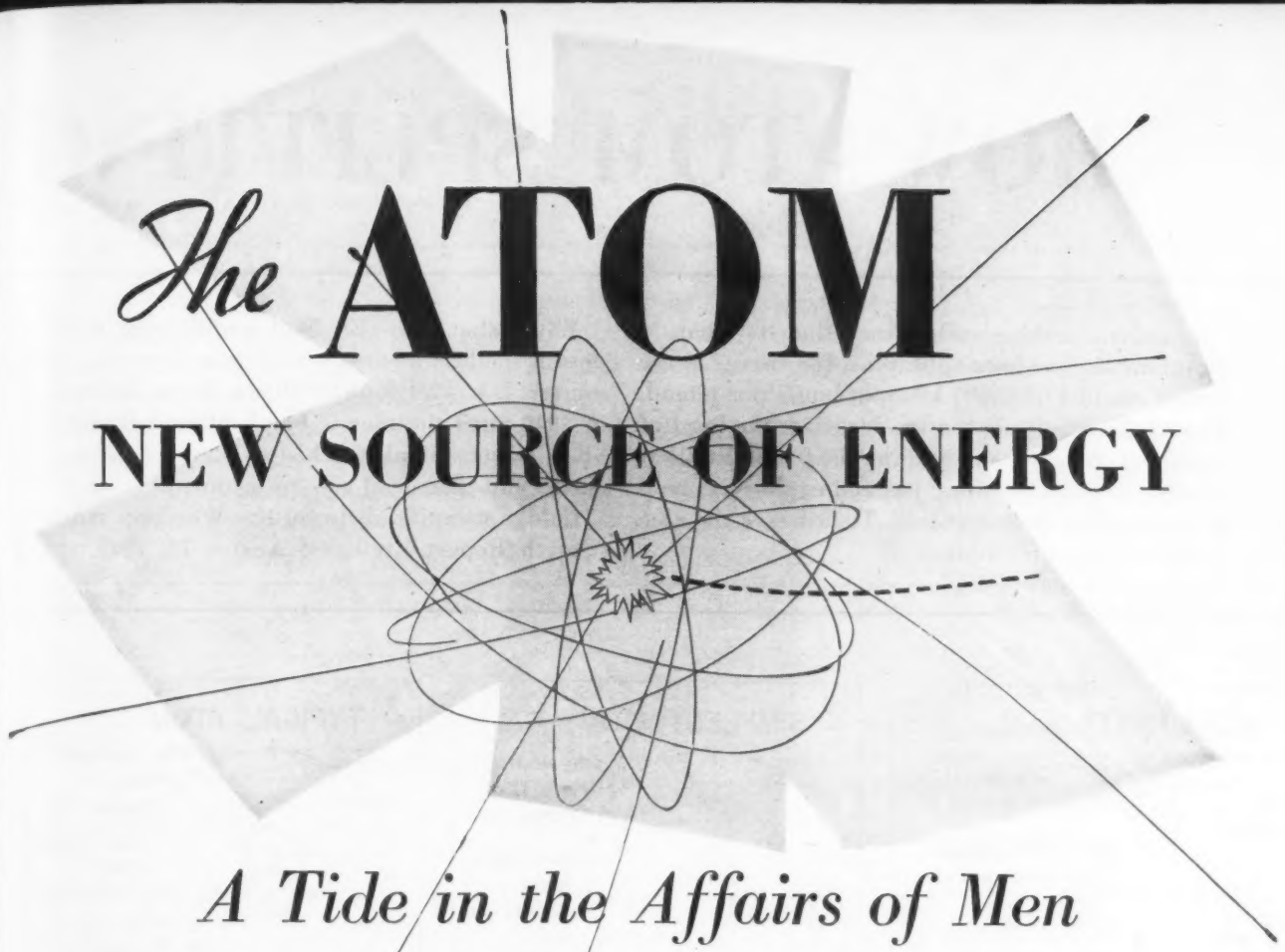
Atomic bomb must not bring complacency, Condon warns

"WE must not develop a Maginot Line mentality in which the atomic bomb is the Maginot Line," declares Dr. Edward U. Condon, associate director Westinghouse Research Laboratories. "What we have done in three years, others can do in perhaps five or six years, especially with the knowledge that it is not a gamble but that it surely can be done. We cannot therefore assume that we shall have the military advantage of this weapon for more than a few years at the most.

"The situation might be summed up thus: Man is now in possession of a new kind of energy source vastly more powerful than anything used before. It is the culmination of a war effort, built on decades of free international exchange of scientific knowledge. While we produced the atomic bomb first, other national groups working independently may not be far behind right now. It is a certainty that, spurred by the knowledge that the thing can be done, any major national group, could, without aid from us and without benefit of espionage, at least do what we have done within a few years. Our knowledge of this field is very incomplete and it may be possible to do what we have done in vastly simpler ways than the only way known to us at present.

"Therefore: We must set up a world order including all peoples to make certain that atomic power is used only for peaceful purposes, and we must continue intensive cultivation of fundamental research in atomic physics to the end that we may really know all about this tremendous new source of power, so that we may apply it to useful purposes and be secure in our faith that by us this weapon will be used righteously in the preservation and further development of freedom everywhere."

The ATOM
NEW SOURCE OF ENERGY



A Tide in the Affairs of Men

On August 6, 1945, an atomic bomb exploded over the Japanese city, Hiroshima.

Its concussion blasted the city, vaporized the fibre of Japan's will to resist, and flashed across the world a light of such glaring intensity that even blind eyes could glimpse the forked road that is presented to humanity's choice and destiny.

It has been a scant fifty years since Pierre and Marie Curie embarked upon their research with the avowed intent of discovering "how the atoms of the universe are put together". Their work contributed radium to the knowledge and use of mankind, but it marked only a way station upon the awesome quest which they announced and which thousands of scientists have since pursued.

Under the compelling stimulus of war, the first major application of the release of atomic force has been in an instrument that raises by an unimaginable dimension our ability to dole out death. We can be devoutly grateful that the scientific leadership of the Allies, and particularly the industrial strength of the United States, brought to us, rather than to our enemies, priority in the development of this dread weapon. But even in its present infant phase, it is clear that ownership of the principle of the atomic bomb carries a trusteeship of terrifying gravity.

We hold in trust a power that is capable of unraveling the very fabric of our civilization. Equally, it may be susceptible of development as a mighty force for human welfare. But we have proved the destructive use, while the constructive applications are still in the realm of speculation.

Clearly the trust is of a magnitude that transcends national jurisdiction. No walls have ever been built high enough to fence in the spread of scientific knowledge, and even if we were resolved to forego the harnessing of atomic power for peace, it is hopeless to think that its application for war can be held for long as the monopoly of one, or a small group of nations.

At one giant stride our scientific and technological development has so far outdistanced our social engineering, that we have no choice but to turn our full powers of creative imagination to control the forces we have unleashed and to bend them to man's use rather than to his destruction.

Since control is not possible without understanding, I have asked several of my editorial colleagues in the McGraw-Hill organization to present on the pages which follow a non-technical but authoritative account of the known facts and implications of atomic power.

James H. McGraw, Jr.

President, McGraw-Hill Publishing Co., Inc.

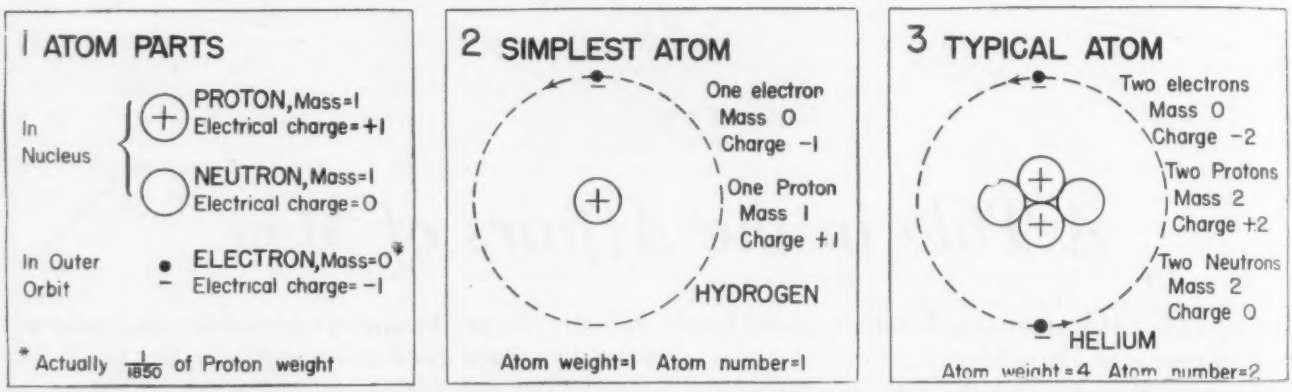
Copyright 1945 by the McGRAW-HILL PUBLISHING COMPANY 330 W. 42nd St., New York 18, N. Y.

HOW ATOM SPLITTING

Five years ago the world learned that the atom of Uranium 235 had been split, releasing energy at the rate of about 11,400,000 kilowatt-hours per pound. The whole amount tested was less than the head of a pin, but there was no escaping the possibility that heaters, engines, turbines, jets and explosives could be powered by atomic energy. Then began the race to win the war with atoms.

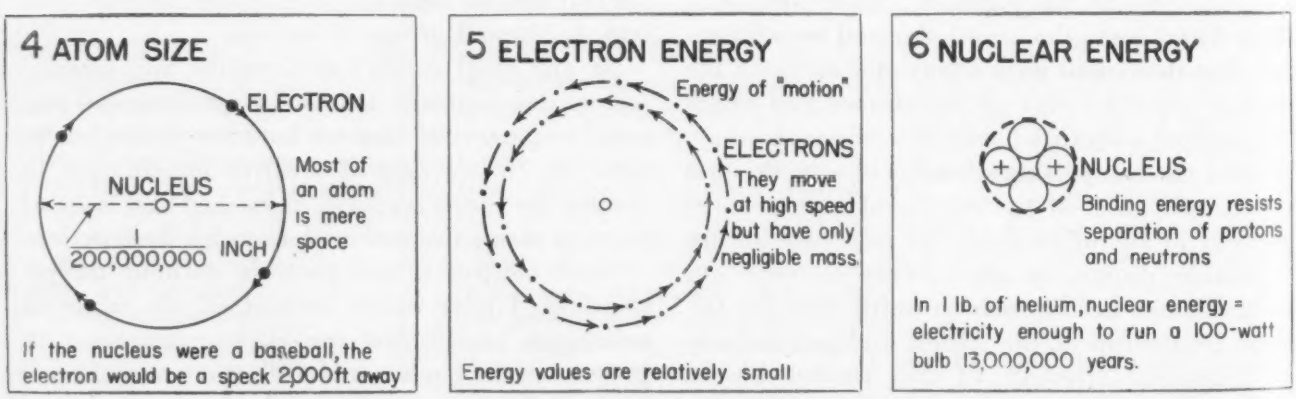
With what help England could give, America outran the best atom-splitting team Germany could muster. It was all done in silence. From the summer of 1940 until the atomic bomb blasted Hiroshima, black secrecy blanketed history's most amazing scientific and industrial accomplishment.

Coldly scientific in form, the War Department's "Smyth Report," released August 12, 1945, traces



Each of the 92 elements has its own *atom*, yet all atoms are made from the same three pieces, Fig. 1: *proton* (weight 1, electric charge +1), *neutron* (weight 1, charge 0), *electron* (weight 0, charge −1).

Every atom is a tiny "solar system." Its central "sun" has one or more protons, generally neutrons too. The revolving "planets" are electrons, one for each proton in nucleus, because plus and minus must balance in the atom. The opposite charges attract, but high speed keeps the electrons out in their circular orbits, just as the centrifugal tendency of the revolving earth defies the sun's gravitational pull. All the weight of an atom is in the nucleus, so add the number of protons and neutrons to get the atom's weight. The *atomic number* is equal to the number of protons. The elements are known by their atomic numbers. Thus uranium (92 protons) is element 92.


4 ATOM SIZE
ELECTRON
NUCLEUS
Most of an atom is mere space
1/200,000,000 INCH
If the nucleus were a baseball, the electron would be a speck 2000 ft away
5 ELECTRON ENERGY
Energy of "motion"
ELECTRONS
They move at high speed but have only negligible mass
Energy values are relatively small
6 NUCLEAR ENERGY
NUCLEUS
Binding energy resists separation of protons and neutrons
In 1 lb. of helium, nuclear energy = electricity enough to run a 100-watt bulb 13,000,000 years.

With only their outermost orbits touching, it would take half a million atoms to span the thickness of a human hair. Yet if one could expand an atom until its outer orbits encircled 100 acres, the nucleus would be no bigger than a baseball. The atom is mostly empty space, Fig. 4, and nuclei are difficult targets; so much so that a neutron bullet fired at a mass of atoms may pass right through without a hit.

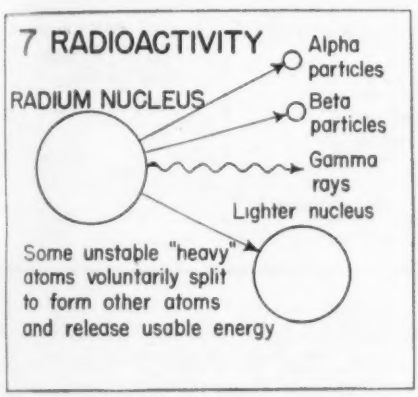
The almost weightless speeding electrons, Fig. 5, supply all the energy of chemical reactions (as when coal burns or TNT explodes). Evading all ordinary chemical action, the immensely greater energy bound up in the nucleus, Fig. 6, can be released only by direct hits on the nucleus to break the bonds that hold the protons and neutrons in a tight bundle.

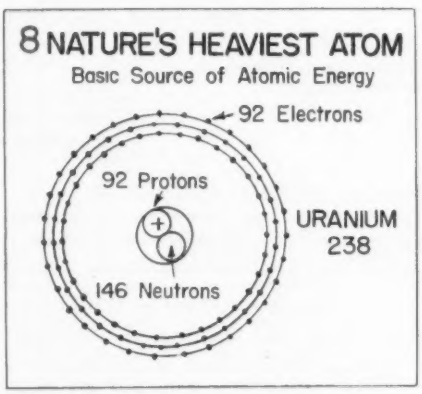
RELEASES ENERGY

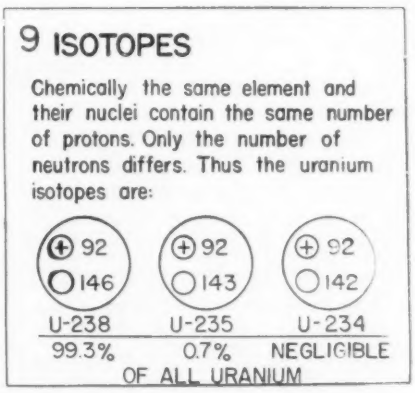
the fantastic course of atomic engineering through the five years of news blackout. It leaves no doubt that only a complete mobilization of America's technical resources could have won this victory in time.

Other writers in other places will unfold the epic story. This presentation leaves no space to reflect the glory of the accomplishment or even to record its history. The aim is more immediately practical — to give the professional and business readers of the McGraw-Hill publications a sound and honest, though non-technical, understanding of this atom-smashing business, so that they will know better what to do about it in their personal and business lives.

Now for step one: learning the shape of atoms and how atom splitting releases energy.

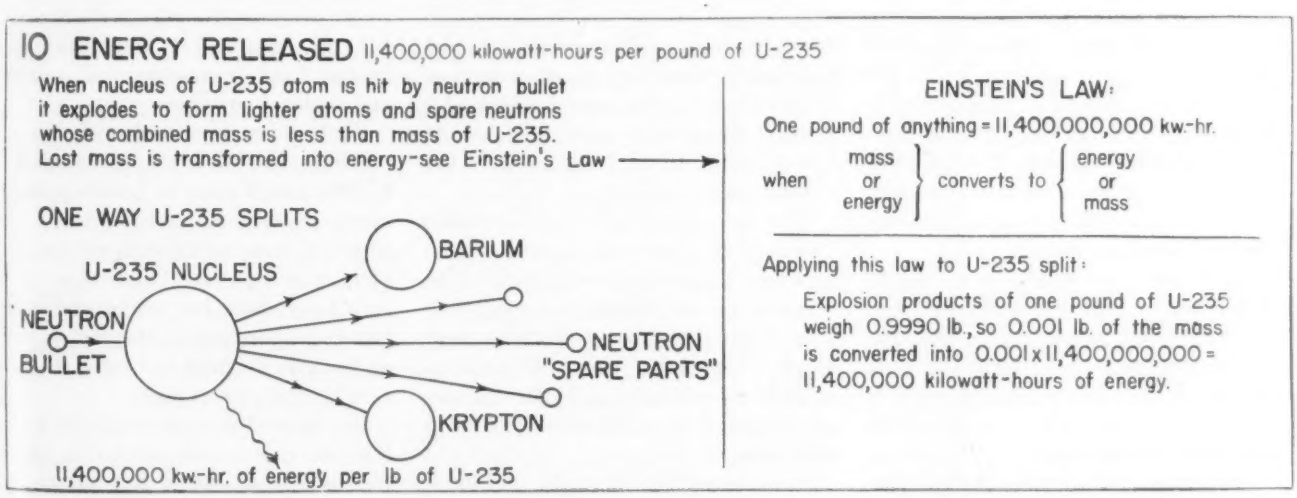






Radium nucleus, Fig. 7, automatically emits particles and energy as it decays to form nuclei of a lighter atom. Most common form of uranium, nature's heaviest atom, is Uranium 238, Fig. 8. This form is not directly useful for energy release, but is important as the raw material for a new synthetic power atom, *plutonium*.

An element may have several *isotopes* — alternate forms with the same number of protons but slightly different numbers of neutrons. Uranium 238 is the isotope in which protons and neutrons total 238 (so atom weight is 238). It is 99.3% of the total weight of pure, natural uranium. The stuff needed for direct atomic-energy release is Uranium 235, only 0.7% of the total weight and very difficult to separate from 238. To put it another way, every pound of energy-giving U-235 comes mixed with a dead load of 140 pounds of relatively inert U-238.

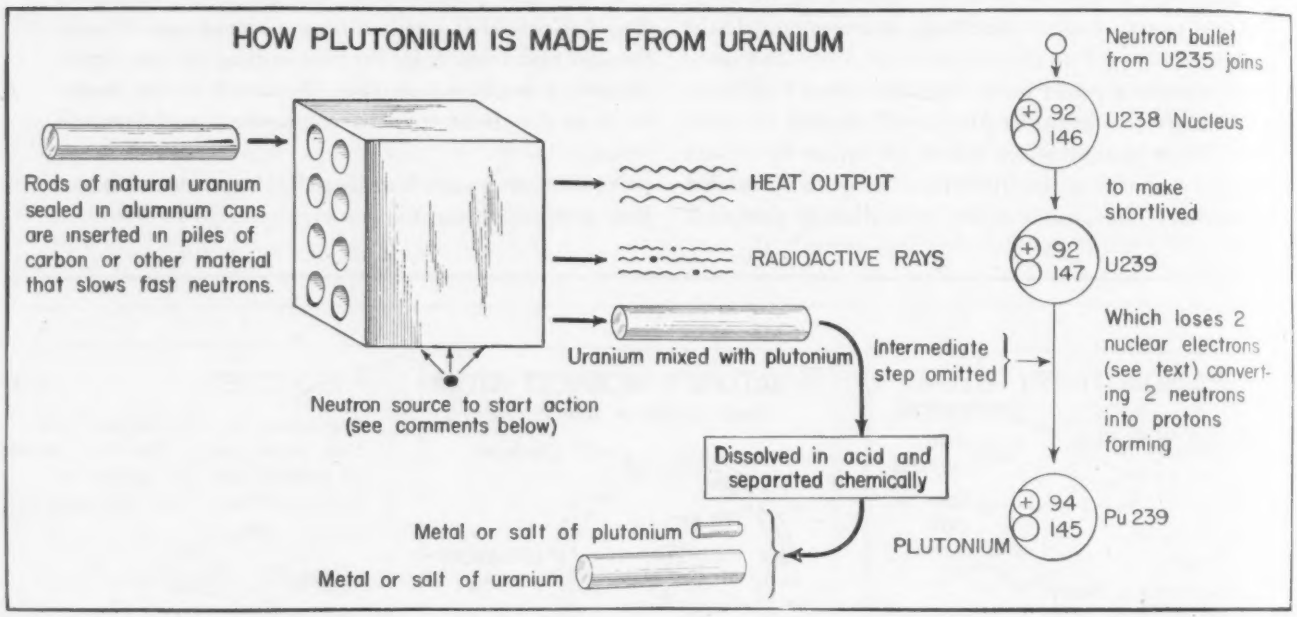

10 ENERGY RELEASED 11,400,000 kilowatt-hours per pound of U-235
When nucleus of U-235 atom is hit by neutron bullet it explodes to form lighter atoms and spare neutrons whose combined mass is less than mass of U-235. Lost mass is transformed into energy-see Einstein's Law
ONE WAY U-235 SPLITS
U-235 NUCLEUS
NEUTRON BULLET
BARIUM
NEUTRON "SPARE PARTS"
KRYPTON
11,400,000 kw-hr. of energy per lb of U-235
EINSTEIN'S LAW:
One pound of anything = 11,400,000,000 kw-hr.
when mass or energy converts to energy or mass
Applying this law to U-235 split:
Explosion products of one pound of U-235 weigh 0.9990 lb., so 0.001 lb. of the mass is converted into 0.001 x 11,400,000,000 = 11,400,000 kilowatt-hours of energy.

Slow neutron bullet splits Uranium 235 nuclear target, generating two lighter atoms (Fig. 10 shows one possibility) and several free neutrons ready to split other U-235 atoms. The following pages show how the original neutron may be produced and directed and how a chain of self-propagating atomic explosions may sweep through a block of U-235 like a forest fire to release heat energy equivalent to 11,400,000 kilowatt-hours per pound.

CONTINUED ON NEXT PAGE

CREATING and ISOLATING

Man-Made Plutonium—U-235 Substitute


HOW PLUTONIUM IS MADE FROM URANIUM
Neutron bullet from U235 joins
92 146 U238 Nucleus
to make shortlived
92 147 U239
Which loses 2 nuclear electrons (see text) converting 2 neutrons into protons forming
94 145 Pu 239
PLUTONIUM
Rods of natural uranium sealed in aluminum cans are inserted in piles of carbon or other material that slows fast neutrons.
HEAT OUTPUT
RADIOACTIVE RAYS
Uranium mixed with plutonium
Intermediate step omitted
Neutron source to start action (see comments below)
Dissolved in acid and separated chemically
Metal or salt of plutonium
Metal or salt of uranium

We now have two kinds of atoms suitable for energy supply, Uranium 235 and the new man-made element No. 94, plutonium. Uranium, No. 92, has the heaviest atom of any natural element.

The Manhattan Project's plant, on the Columbia River at Hanford, Washington, is the world's greatest atom-making factory. Devoted entirely to the mass production of plutonium atoms, it uses U-238 as the raw material and U-235 as the energy source, intimately mixed in the same proportions as in natural uranium metal.

The production units at Hanford are several huge uranium "piles." Each is a very large block of graphite with holes in which are placed uranium-metal cylinders, sealed in aluminum cans to protect the uranium from corrosion by the cooling water constantly pumped through the pile.

Each pile runs itself, so to speak. Not even the conventionally pictured bits of radium, beryllium and paraffin are needed as a "pilot light" to start operation. There are always enough stray neutrons, or even cosmic rays, to start a chain reaction.

But once started, the design, size and control of the unit must be such that the chain reaction will continue at an even rate — neither die down nor overshoot into an explosion.

To see this picture in atomic terms, consider the fraction of a second in which one million U-235 nuclei are split, producing two million lighter atoms (say, one million of barium and one million of krypton) and between one and three million fast-moving neutron projectiles.

Some of these escape in free flight right through the relatively vast atomic "open spaces." Some are "captured" by the many U-238 nuclei, and others are captured by the impurities. But, on the average, of the one to three million, just one million neutrons must succeed in smashing another million U-235 atoms in the next fraction of a second. Thus, with reproduction rate exactly maintained, life goes on in the atomic-energy pile.

The carbon, one of several possible "moderators," serves to slow down the neutrons without capturing many. The chance of a fast, straight-moving neutron hitting a tiny nucleus is very small, whereas the "slow ball" neutron is likely to be sucked in by the nuclear attraction if it would otherwise be a near miss.

From the practical angle, maintaining a chain reaction requires careful design and good controls. The pile must be slightly larger than actually necessary for a chain reaction (that means scores of tons of material). Controls must be sensitive and dependable. They slow the pile down to the balancing point by sliding in retarders, such as strips of cadmium.

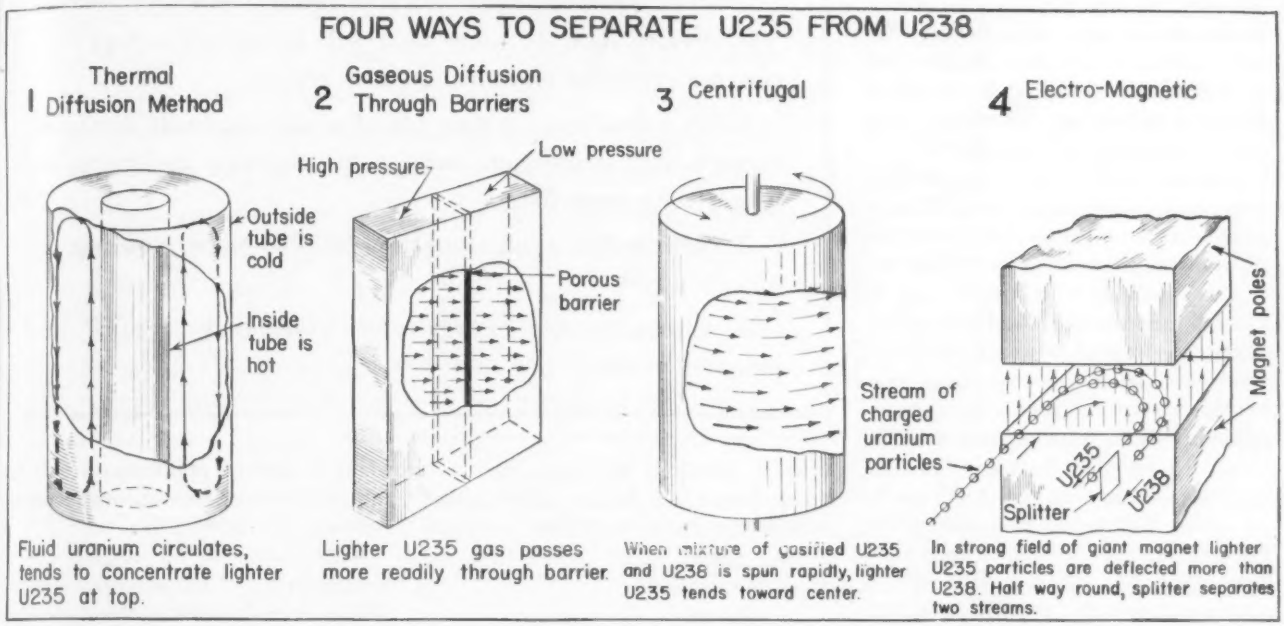
As already noted elsewhere, the energy released is about 11,400,000 kilowatt-hours for each pound of U-235 split. This energy appears first in the high speed of the pieces thrown off by the atomic split, then is converted to sensible heat as collisions slow down these projectiles. The energy is finally removed from the pile in the form of hot air, steam, hot water or other heated fluid in commercial quantity and thermal condition.

Such piles, operated with normal uranium, or with uranium enriched in U-235, would seem to be the primary means by which atomic energy will serve (if ever) as a commercial source of heat and power. Plutonium would be a byproduct, but might under certain conditions add to the energy yield of the pile without the need to separate it from the uranium.

The use of normal uranium in the Hanford pile sounds extremely attractive as a heat source, but has certain economic disabilities. Only a small part of the U-235 is used up before the pile must be shut down to remove the plutonium.

THE HIGH-POWER ATOMS

Isolating U-235 — a Gigantic Task


FOUR WAYS TO SEPARATE U235 FROM U238
1 Thermal Diffusion Method
2 Gaseous Diffusion Through Barriers
3 Centrifugal
4 Electro-Magnetic
Outside tube is cold
Inside tube is hot
High pressure
Low pressure
Porous barrier
Stream of charged uranium particles
Magnet poles
U235
U238
Splitter
Fluid uranium circulates, tends to concentrate lighter U235 at top.
Lighter U235 gas passes more readily through barrier.
When mixture of gasified U235 and U238 is spun rapidly, lighter U235 tends toward center.
In strong field of giant magnet lighter U235 particles are deflected more than U238. Half way round, splitter separates two streams.

Many of the uranium ores, including most samples of pitchblende and carnotite, will yield from 1 to 15% metallic uranium. Chemical separation of the metallic "natural" uranium is simple. Whatever the source, natural uranium contains the three isotopes in the constant proportions of 99.3% U-238 and 0.7% U-235, with traces of U-234.

Separating the U-235 from U-238, an operation essential for explosive uses of U-235, and probably important for future commercial controlled-chain piles, has been most difficult. Chemical separation was impossible because U-235 and U-238 are chemically the same.

The only possibility was a separation by physical differences, primarily a one percent difference in weight. The porous barrier and centrifugal methods pictured above required vaporizing a salt of uranium. All the methods shown have been used or tried on the Manhattan Project. All require many stages to achieve a substantial concentration of Uranium 235.

Dollarwise Thoughts on Atomic Energy

Costs mean little in war, but peacetime uses of U-235 and plutonium must pass the dollar test in competition with coal, fuel oil, natural gas, gasoline and electricity.

On the basis of energy costs only, *"all other things being equal,"* the table on the last page of this section shows at what price per pound U-235 would give the same energy cost as conventional energy sources selling at the indicated prices. For such comparisons it is convenient to remember that one pound of U-235 is equal (energy-wise) to about 11,400,000 kilowatt-hours, also to 1500 tons of coal, or 200,000 gallons of gasoline.

Fuel engineers understand the limitations of such oversimplified comparisons. Others should be warned that "all other things" are never equal. With this thought in mind, reconsider the uranium piles operated at Hanford to produce plutonium. These use U-235 in the cheapest form, say about $1400 per lb., assuming purified normal uranium at $10 per lb. (140 lb. of uranium contains one pound of U-235.)

If this were the whole story, coal would have to sell for a dollar a ton to break even with U-235 as a water heater. However, the pile using normal uranium must be immense to hold its own in a chain reaction. More important, the accumulating fission products "poison" the reaction after only a small part of the U-235 has been used up. Then the uranium cylinders must be removed for plutonium recovery. Finally, it has not yet been found possible to operate the normal-uranium piles at high enough temperatures for practical power production.

If we go to the other extreme and build a small pile, using concentrated U-235, we shall run into excessive material costs, perhaps several times the $52,000 per lb. set down in the table as the equivalent of 20-cent gasoline.

Something between the two extremes is likely to prove the most economical — perhaps a pile operating on a U-235 concentration between 1 and 10%.

The engineer of the "atomic-power age" must know the price of Uranium 235 *in various concentrations* and the characteristics of piles suited to them. No such information is yet available. He must also watch the danger from radio-activity; the requirements for radiation shields; explosion hazards, etc.

CONTINUED ON NEXT PAGE

WHAT TO EXPECT

Before discussion of possible and probable future applications of atomic energy to the arts of peace, the atomic bombs should have consideration. We may assume that these bombs contained from two to 200 lb. of either U-235 or plutonium, or both. No more precise information is available.

Details of the bomb design have been completely suppressed, but the following basic considerations are stated or implied in the Smyth Report:

The explosive in a bomb must be highly concentrated U-235 or plutonium. Since slow neutrons could not produce a satisfactory explosion, the neutron retarder or *moderator*, is minimized. This, in turn, requires a U-235 mass so large that the escape of neutrons without hitting nuclei will not be excessive. For every 1000 atoms hit, the neutrons produced must split more than 1000 new atoms, so that the reaction will proceed rapidly in an expanding chain, as sketched below.

There can be little leeway in the size of the explosive charge. For a given shape there is a certain "critical" weight of material. If this is exceeded the bomb explodes instantly. If the weight of charge is less than the critical, it cannot be made to explode.

Therefore, the critical mass must be created at the moment of explosion.

The Smyth Report suggests that this can be accomplished by breaking down the charge into two or more well-separated parts, each having less than the critical mass. At the appointed moment these could be brought together within the bomb to create a supercritical mass, which would then explode automatically.

CLAIMS LIKE THESE ARE NOT JUSTIFIED

1. Pretty soon no more coal will be mined except as a raw material for chemical manufacture.

2. In a few years a tiny bit of uranium, built in at the factory, will drive your car for life through an engine no bigger than your fist.

3. All the big central stations will soon be running on atomic power.

4. Cheap atomic energy will enormously reduce the price of power.

Peacetime Applications

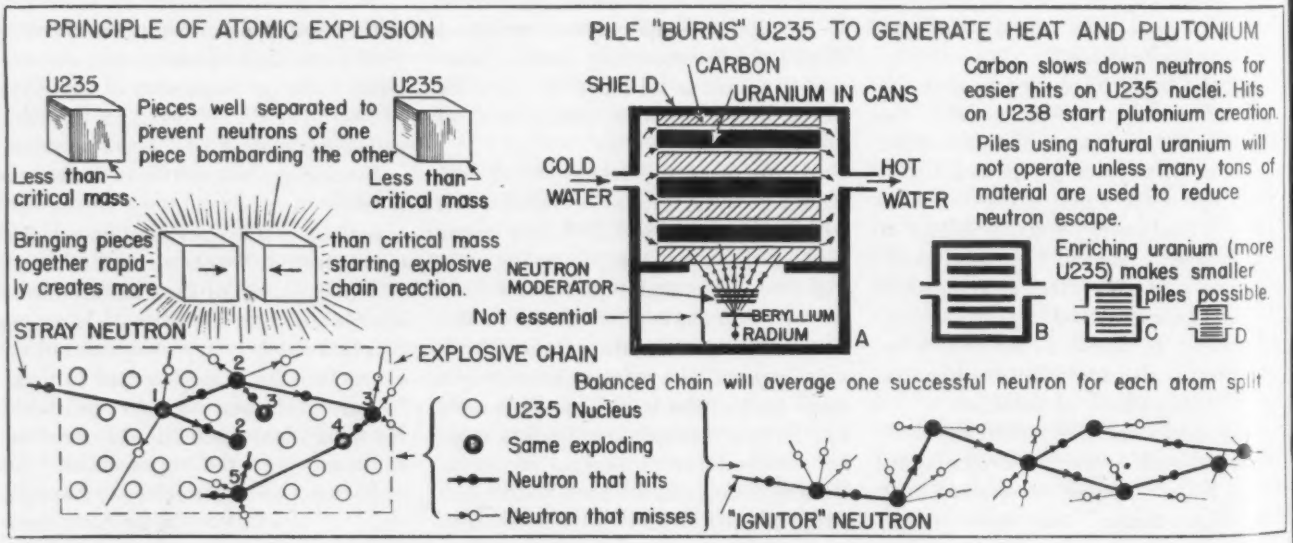
Except possibly for superblasting operations, uncontrolled explosive reactions cannot be permitted in the peacetime use of atomic energy. This means that the quantity of U-235 assembled in any one spot must always be kept well below the critical weight to avoid spontaneous explosion.

Depending on the particular application, the most desirable concentration of U-235 may range anywhere from the 0.7% in normal uranium up to 100%, with the probability that many industrial applications will find the greatest economy in concentrations between 1% and 15%.

This matter of the degree of concentration of U-235 has received little public attention, yet nothing could be of greater practical importance. To make this point clear, consider the two extremes, 0.7% of U-235 and 100% of U-235, respectively.

The Hanford pile, using normal uranium (0.7% U-235) with carbon moderator, must be very large to work at all. It is inefficient in the sense that it must be shut down after a small part of the U-235 has been consumed. It cannot operate at high temperatures.

Its great advantage as a heat producer is the fact that its U-235 is bought at the lowest possible price. If


PRINCIPLE OF ATOMIC EXPLOSION
U235
U235
Pieces well separated to prevent neutrons of one piece bombarding the other
Less than critical mass
Less than critical mass
Bringing pieces together rapidly creates more than critical mass starting explosive chain reaction.
STRAY NEUTRON
EXPLOSIVE CHAIN
PILE "BURNS" U235 TO GENERATE HEAT AND PLUTONIUM
SHIELD
CARBON
URANIUM IN CANS
COLD WATER
HOT WATER
NEUTRON MODERATOR
Not essential
BERYLLIUM
RADIUM
A
Carbon slows down neutrons for easier hits on U235 nuclei. Hits on U238 start plutonium creation.
Piles using natural uranium will not operate unless many tons of material are used to reduce neutron escape.
Enriching uranium (more U235) makes smaller piles possible.
B
C
D
Balanced chain will average one successful neutron for each atom split
U235 Nucleus
Same exploding
Neutron that hits
Neutron that misses
"IGNITOR" NEUTRON

FROM ATOMIC ENERGY

. . . BUT REMEMBER THESE FACTS

1. The large-scale, controlled release of heat energy from U-235 has been fully demonstrated.

2. Beyond question, this energy could be applied directly for heating water and air, and making steam.

3. Such heat, in turn, could be applied directly, or converted into mechanical power or electricity by conventional steam turbines and gas turbines.

4. If and when U-235 in concentrations up to 10% costs less than $25,000 per lb., it may find applications, but will compete, at first, with premium fuels rather than coal.

purified normal uranium sells for, say, $10.00 per lb., the price of 140 lb. (containing one lb. of U-235) will be only $1400. This would be a very favorable price if the pile could operate efficiently with the 0.7% U-235.

Concentrating the U-235 to 100% would permit a much more compact and convenient pile — perhaps little more than small pieces of U-235, encased in aluminum to ward off corrosion, and immersed in a tank of water; this should convert the water into steam at a regulated rate.

In large part, the control would be inherent. The water as a moderator would keep the chain going, but if the reaction got too violent, the resulting higher superheating of the steam would decrease the moderator effect and thereby hold the reaction in check. Yet even if all this comes true the cost of concentrated U-235 in the near future will be many times $10,000 per lb.

Running up the concentration only a few percent above that in normal uranium may prove to be the way to get reasonable pile size and good efficiency without incurring exorbitant concentration costs.

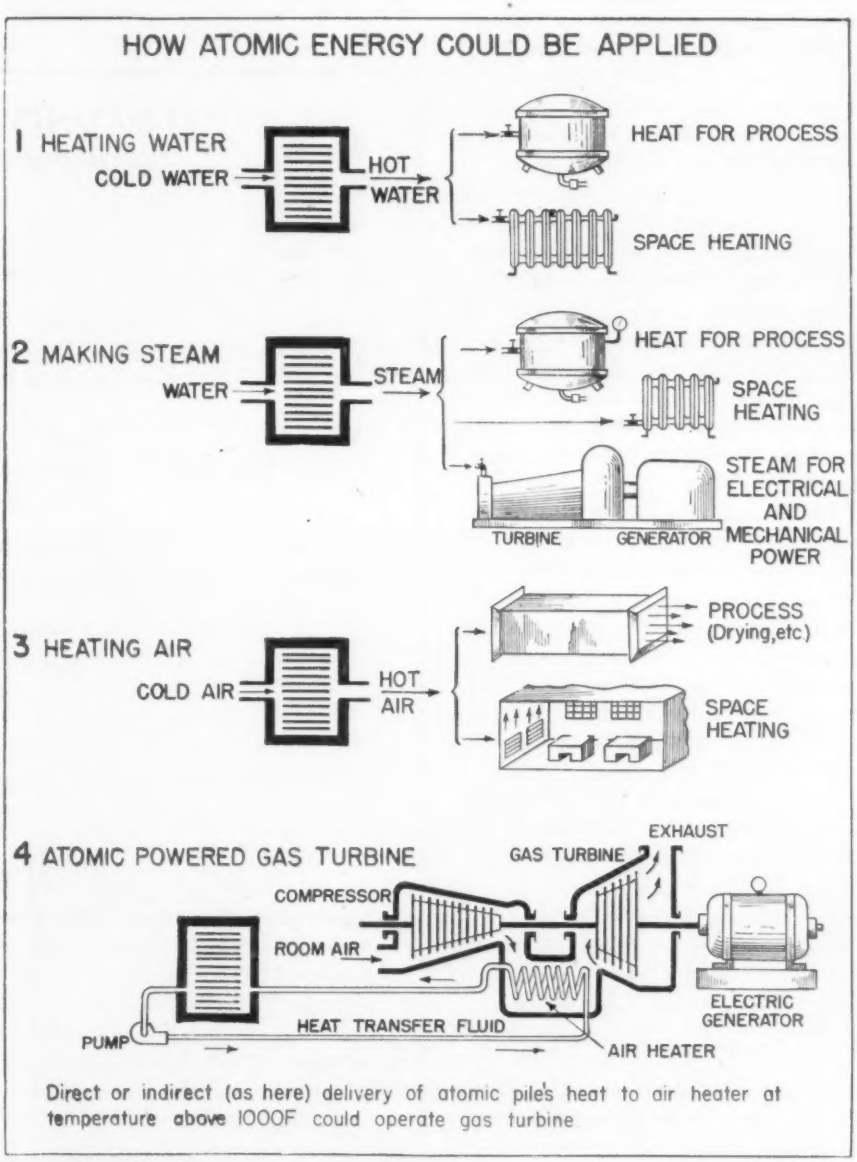
When atomic energy is applied, the starting point is heat, picked up by water, air or a special heat-transfer fluid. Intermediate heat transfer fluids may be essential in certain applications (space heating and service water, for example) where people must be protected from injury by radioactivity.

The intermediate heat-transfer fluid shown for the gas turbine would, of course, have to operate at temperatures up to 1200 F. There seems to be no basic reason why the pile itself could not be built inside the compressed-air receiver, discharging its heat directly to the compressed air.

With rather high concentration of U-235, this arrangement might be suitable for large airplane drive if excessive weight of radiation shields could be avoided.

Also, presumably, rockets and planes of the "buzzbomb" type could be powered by atomic heat delivered to the air of the jet steadily, not in puffs.

The sketches stress direct applica-



Direct or indirect (as here) delivery of atomic pile's heat to air heater at temperature above 1000F could operate gas turbine

THESE THINGS MIGHT RESTRICT USE OF ATOMIC ENERGY

1. Ineffectiveness of large piles using normal U-235 concentration
2. High cost of concentrated U-235 for smaller, more effective piles
3. Danger from radioactivity
4. Weight and cost of shielding against radiation
5. Explosion hazard
6. Possible short supply of uranium
7. Governmental restrictions on atomic-energy materials

tions of hot air, steam and hot water to process and space heating. This emphasis is justified by the often overlooked fact that such applications of heat have many times the total energy value of all the electricity generated in the United States for all purposes.

There has been much popular speculation regarding the type of engines required for atomic-power generation. The answer is simple. Present engines, steam turbines and gas turbines can be used with little or no change. This, of course, does not rule out the possible discovery of specialized engines for atomic power, or even direct production of electricity from atomic energy.

In the long run the implications of atomic power are staggering for both war and peace. However, popular writers on the subject have undoubtedly created unreasonable hopes in the minds of readers — for example, the expectation that in two or three years the Detroit builders will market cars with built-in "lifetime" slugs of U-235 and "fist-sized" engines.

Yet it seems fairly safe to predict that atomic energy will find some commercial applications within the next five or ten years, first, probably, as a premium fuel like aviation gasoline, worth a fancy price for specialized applications where low weight or some other characteristic is important.

As the cost of concentrating U-235 is reduced and application efficiencies improved, atomic energy may compete with cheaper fuels, perhaps ultimately with coal.

Important non-power applications of atomic energy may well include the ultra-high-temperature processing and fabricating of materials — also, modern "alchemy": building and rebuilding atoms to create new elements and to produce old elements at lower costs.

Radioactivity obtained directly or indirectly from artificial atom-splitting should find many important medical and industrial applications.

Turning back to ordinary power applications, we must avoid the temptation to overstress the economic importance of lower-cost power fuel. Fuel cost is only about 17% of the gross receipts of the electric utilities. Here's another way to put it: If, after allowing for transmission losses, one kilowatt-hour delivered to the consumer from modern plants represents a coal consumption of 1.5 lb., and if the coal costs $5.00 per ton cancellation of the coal bill could not save more than ⅜ of a cent per killowatt-hour. And atomic fuel will certainly not be free.

Performance of the atomic bomb is a monument to the scientists who unlocked the secrets of the atom and suggested the basic technique of making plutonium and concentrating U-235.

From there on, the job was at least 50% engineering. The various big plants of the Manhattan Project are vast assemblages of pipes, tanks, boilers, valves, instruments and controls, installed and operated by engineers, largely designed by engineers. From now on, the speed with which atomic power becomes practical will depend on the effectiveness of the engineer-scientist team.

It is possible, of course, that national controls may completely upset the entire technical and economic pattern of this discussion. For reasons of national security the government may decide to control or restrict atomic-power materials, plants and operations in ways not yet determined.

U-235 COULD COMPETE AT THESE PRICES

other things being equal

Common fuel	*Assumed prices*	*Comparable prices for Uranium 235, dollars per pound (nearest thousand)*
COAL (13,000 B.t.u.)	$6 per ton	$9,000
	$12 per ton	$18,000
	$15 per ton	$23,000
FUEL OIL (150,000 B.t.u. gal.)	2¢ per gal.	$5,000
	4¢ per gal.	$10,000
	8¢ per gal.	$20,000
CITY GAS (500 B.t.u.)	50¢ per 1000 cu. ft.	$39,000
	$1 per 1000 cu. ft.	$78,000
NATURAL GAS (1000 B.t.u.)	25¢ per 1000 cu. ft.	$10,000
	50¢ per 1000 cu. ft.	$20,000
	$1 per 1000 cu. ft.	$40,000
GASOLINE (150,000 B.t.u. gal.)	10¢ per gal.	$26,000
	20¢ per gal.	$52,000
	30¢ per gal.	$78,000

BUT

Note that "other things" are never equal. U-235 in normal uranium form is by far the cheapest, but involves use of excessively large and inefficient "piles." The unit cost of the U-235 in enriched mixtures increases with the degree of enrichment. Over-all cost comparisons can be made only for a specified concentration of U-235 and for apparatus suitable for that particular concentration. Possible explosion danger and need to protect personnel against radiation are other important considerations.

Nylon Hose or Atomic Bombs

Hanford project, thought by some to be making nylon stockings or a new lethal gas, proves to be the production site of civilization's most revolutionary development—the atomic bomb

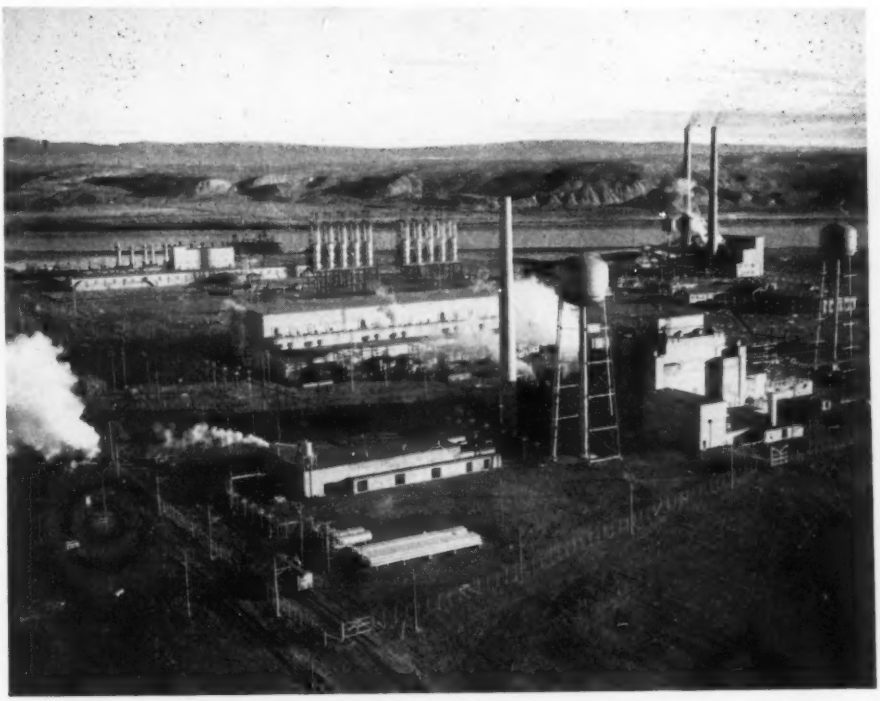
Walter C. Heston
Engineering Editor, Electric West

POWER, water and wide open spaces, found in abundance in the West provided birthplace for civilization's most revolutionary development—the atomic bomb. Not only did the West provide an idea site on the Columbia River in central Washington, but it contributed importantly to research that unlocked the secrets of atomic energy through the work of its own Dr. E. O. Lawrence of the University of California and many of his students in development of the atom smashing cyclotron.

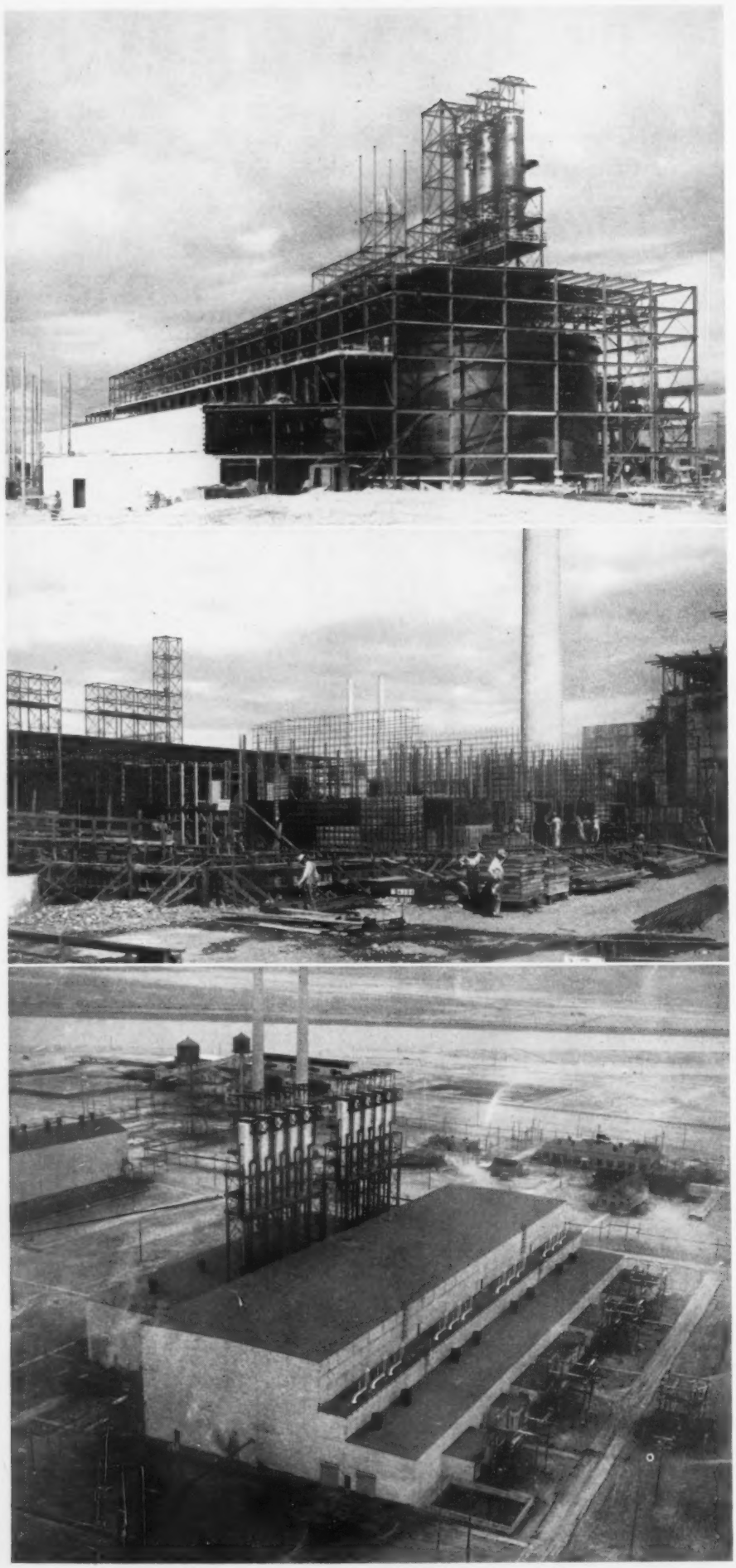
Quick to realize the significance of the epochal news that broke on Aug. 6 with the dropping of the first atomic bomb, ELECTRICAL WEST immediately dispatched its engineering editor to the Hanford Engineer Works. With the war at an end, much of the mystery of the atomic bomb has been unveiled, but to the writer who had the rare opportunity of visiting the project within 48 hours after the story broke, there are, however, certain phases of the story missed by others that will interest readers of ELECTRICAL WEST.

The press was taken on a 70-mile "inspection" tour of the vast 400,000-acre project situated along the west bank of the Columbia River north of Pasco, viewing large plant areas through wire fence barricades. Three plant areas were observed, one containing a single group of buildings which would logically seem to be a receiving and preparation center; another area with three widely separated groups of similar plant facilities, and a third area, likewise with three sets of widely separated building groups.

End product at Hanford is plutonium obtained from uranium ore found in Canada and elsewhere. Two new elements came out of atomic research, neptunium, No. 93 and plutonium, No. 94, the latter having an atomic weight of 239. It had been known that splitting of the uranium isotope U235 with slow moving neutrons released tremendous energy. Uranium ore contains only one part in 140 of U235, most of the balance being another isotope, U238. The problem was to separate out the U235



One of six large factory areas (top) at Hanford Engineer Works, where plutonium was made for the atomic bomb. Below—Midway substation on Coulee-Bonneville 230-kv. lines is feed point for 230-kv. loop serving Hanford works



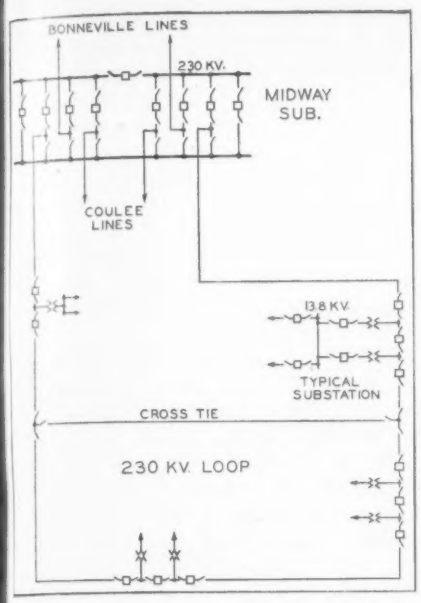
and in sufficient quantities for military purposes. When U235 atoms in uranium are bombarded with neutrons, some are absorbed by the U238, and a new unstable element, neptunium, is formed which quickly turns into plutonium. The plutonium atom when split also releases tremendous energy, and has the possible advantage that it is more easily produced from uranium ore than U235 and by a relatively simple process.

When a joint research committee made its report in June 1942, it was then decided to make plutonium as well as U235. Processes were selected and full scale plants erected with all possible speed, since production was known to be a race with Germany. In Tennessee the Oak Ridge plant was built. Here two processes were used to produce U235, both successful. One under direction of Dr. Lawrence used the mass spectograph method, the other microscopic screens. At Hanford a successful process was developed for producing plutonium in a $348,000,000 project built and operated for the government by the Du Pont company under direction of U. S. Army Engineers.

Techniques of the process are secret, but it is known that a chain reaction is produced in large graphite "piles" and that great heat is generated—in fact sufficient to raise the temperature of the Columbia River. Moreover, the cooling water was found to be radioactive and means had to be found for deactivating before returning the water to the river. Another problem was that gases and particles, emitted from large stocks, also were radioactive, but this difficulty was likewise solved. There were many problems of handling and weighing minute quantities, of exacting controls and temperatures and of protecting workers against harmful radiations. All work is done behind shielding barriers by remote control, so interlocked that it is impossible to make an error. Workers carry radioactive detecting devices and there are devices for detecting a passing radioactive worker and even his ray emanating clothing. It all sounds like a Frankenstein, but actually the plants are said to be the safest to be found.

Several by-products for which no use has yet been found are stored and the plutonium was shipped to the bomb assembly plant in New Mexico. Plutonium in small quantities is a fairly stable element and might be stored for 20,000 years, but when built up to a certain critical mass, a chain re-

Construction scenes at Hanford; 780,000 cu.yd of concrete, 1,500,000 concrete blocks and 750,000 cement bricks were used. Construction force 45,000



230-kv. loop circuit provides reliable power for atomic bomb factories

action, called "fission" starts, and—Hiroshima! Not only is a steel wall air wave-front set up, but the temperature is something terrific, probably about a million degrees C., and every living and material thing is vaporized, leaving not a trace.

Power Supply

A well designed power supply system is observed, consisting of a 230-kv. loop on wood-pole H-frame structures, with cross-tie in the center of the loop. This loop circuit is fed from a sectionalized bus at Bonneville's Midway substation which is located at the end of the vast site. Continuity of service had been stressed and the nature of the power supply would serve further to indicate that uninterrupted operation of plant processes was a prime consideration.

Water was a prerequisite, and water naturally involves pumping. If uninterrupted water supply is as important as it is in many industrial processes, then we might expect that both motor-driven and steam turbine-driven pumps would be operated in series and that further protection against power failure would involve quick-starting turbine-driven generators, similar to those used in oil refineries. These requirements would mean a steam and steam-electric station at each of the widely separated plant areas. Such steam generation, together with heating requirements in the town of Richland, might call for large quantities of coal. Further, if water temperature was an important factor, then the higher temperature of the Columbia River in the summer would mean a summer pumping peak, or the water might be cooled by refrigeration, which would accomplish the same result, and that also would produce a summer peak.

Peacetime Use

If the two billion dollars said to have been spent in research and development of the atomic bomb be considered as an expendable weapon of war, then the stake was well worth it. But peacetime use of atomic energy may well prove man's greatest blessing. So far we are told that no great amount of research has been devoted to finding a means of releasing atomic energy under control and that it may take several years to fully explore this field. Some believe that the U235 atom and the plutonium atom may prove too potent a source of energy to be brought under control. After all, we do not use TNT in our automobiles. Perhaps the atoms of some of the other elements, such as for instance the hydrocarbons of petroleum, might be one direction of research in this regard.

It may take from one to ten million kilowatt-hours, or the equivalent heat and mechanical energy, to produce a pound of U235, so the matter of economics enters strongly. If it were 5,000,000 kwh., at two mills, the cost would be $10,000 a pound for electrical energy alone, to say nothing of price of raw material, operating cost and wages on capital. Of course, how much energy is locked up in the atoms of a pound of U235? One scientist has stated that it is equivalent to the energy in 5,000,000 lb. of coal. If it were 10,000 B.t.u. per lb. coal, that amount of coal would produce 15,000,000 kwh. at 100% efficiency, or 5,000,000 kwh. if burned in a modern steam-electric station. If 15,000,000 kwh. is anywhere nearly correct for the amount of energy in a pound of U235, some conception of the tremendous force released by the atomic bomb is gained from the fact that, if 15,000,000 kwh. were expended in 1/100 second, the resulting force would be seven trillion, two hundred and fifty billion horsepower (7,250,000,000,000). And, how many pounds of U235 or plutonium are contained in the atomic bomb? Presumably the "pay load" of the atomic bomb is quite small? And again, we are told that in the present atomic bomb, only a fraction of the potential energy of the atom has been utilized.

All of this leads to a lot of speculation, and to get back to things mundane it seems only reasonable to believe that, if atomic energy can be brought under control, there will be, or there will be provided, a transition period sufficiently long to permit civilization to readjust itself.

Truck Maintenance

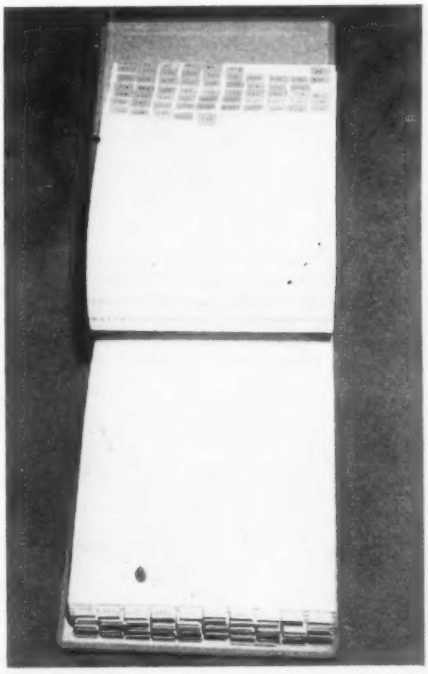
H. M. Baker

Automotive Service Foreman, Power System
Los Angeles Department of Water & Power

IT IS now well established that laboratory analysis of oil removed from the crankcase of automotive engines can reveal important conditions existing within the motor which may be corrected with minor expenditures, if discovered in time, and may prevent costly breakdowns or overhaul jobs. The following conditions are determined by the methods used in analyzing the oil: percentage of fuel dilution; percentage of solids or sludge; the presence of metal and the type of same if in abnormal quantities; presence of water, and whether or not it is emulsified; presence of gums, tars and similar residues, fuel soot, free carbon and sand or dirt. The stability of the oil is also revealed by showing its viscosity after being used, as well as the type of dilution and whether the operating temperature of the motor is too cold, normal, or too hot.

The practice of preventive maintenance as carried on for several years by the automotive and construction equipment section of the Department of Water and Power of the City of Los Angeles has proved particularly important and valuable during the war period. Use of the oil analysis is only one of several inspection services used by the shops and service sections of the

Each oil analysis report is "entered" in this ledger. One sheet, front and back, will contain record for life of equipment



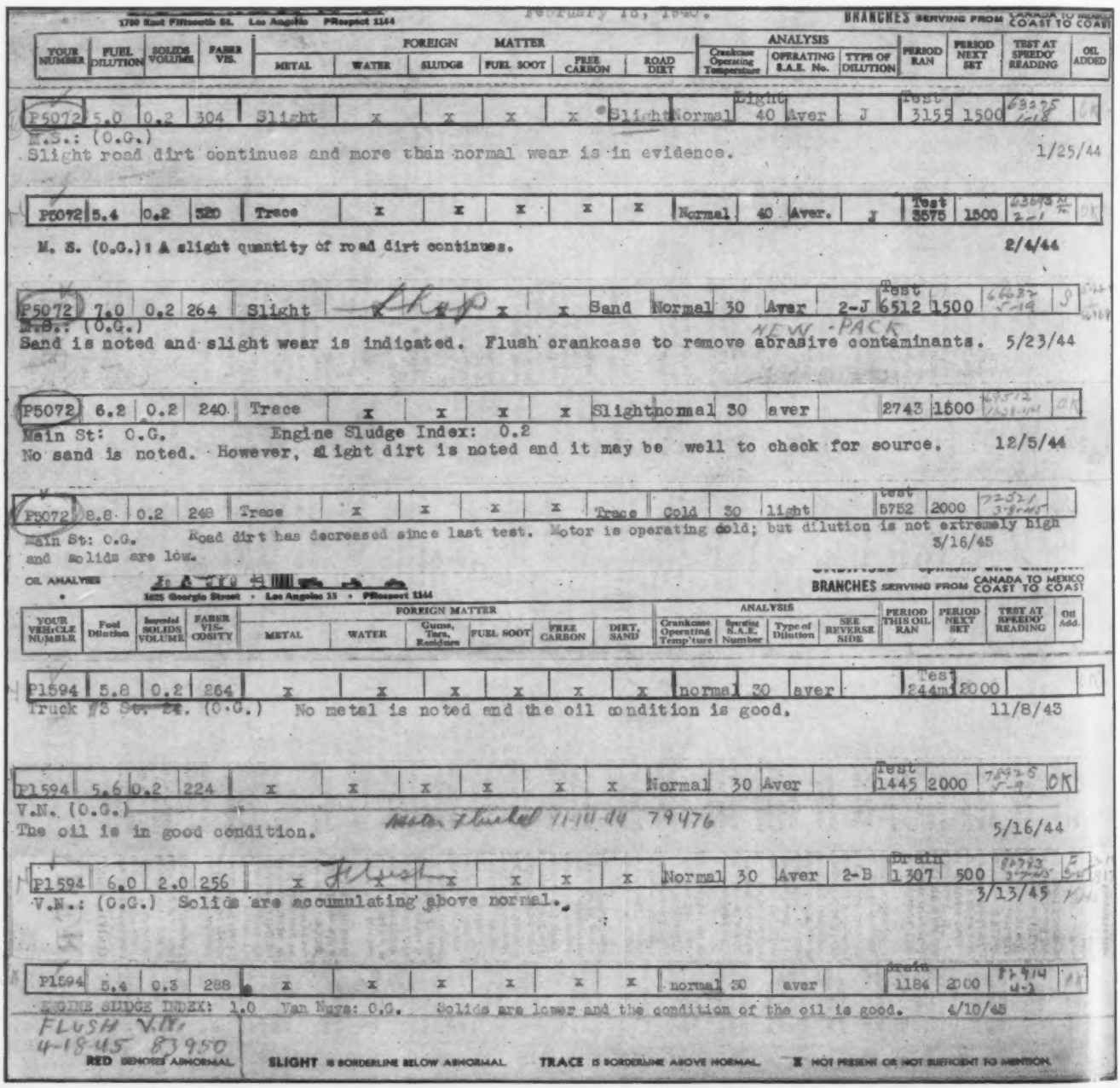
department in maintaining the fleet to a high degree of operating efficiency.

Oil analysis reports furnished by a commercial laboratory show the results of samples from six vehicles on each sheet. These are perforated so that the report for each individual vehicle may be separated from the others and filed with other reports pertaining to the same vehicle. These reports as they come in from the laboratory are pasted on loose-leaf sheets as illustrated and placed in a loose-leaf record book, also shown. This method of keeping records eliminates three cross-reference records formerly used and makes possible ready reference to the complete history of any vehicle. One page should last the life of a car or truck, both sides being used. Make, model and equipment number is shown on each page and notations are made on each strip report, showing action taken, if any is indicated. Oil filter installation is indicated by a red circle around the equipment number.

Certain percentages and conditions shown in the reports are established as "normal." When fuel dilution, solids, or sand and dirt appear on the reports and the trend in successive reports begins to reach an abnormal percentage, the motor is given a thorough flush job to clear up the condition. When metal is reported as slight, a flush job is ordered and a careful check of the sample taken at the next oil change is made to see if metal is still present. When excessive metal is shown it is identified as ring and wall, or bearing metal, or both. Usually a shop job is ordered to check the bearings for excessive wear, broken piston rings or scored cylinder walls. If conditions show slight or excessive amounts of water, gums and tars, fuel soot or carbon, or combinations of these in lesser amounts, a motor purge, head gasket check, or motor tune-up in general is ordered to correct the condition.

Conditions determined by means of crankcase analysis at a nominal cost can only be obtained otherwise by costly disassembling, which necessitates taking equipment out of service. This is a very important consideration in the operation of approximately 1,200 units of automotive and construction equipment by the Los Angeles Department of Water and Power.

Sample sheets from crankcase oil record book. As the strip record slips come from the laboratory, they are entered on the gummed ledger sheet for that particular piece of automotive equipment. Five reports have been entered on top sheet and four on lower



Effect of Frequency Change Told Trade

War's end will speed Southern California Edison Co. changeover from 50 to 60 cycles, so dealers are urged to buy stock with this in view

V-J DAY will expedite the actual frequency changeover from 50 to 60 cycles in the territory served by the Southern California Edison Co. by several months and in all probability the total time required will be reduced to three years. This information was revealed to manufacturers and distributors by Edison officials last month, as plans were inaugurated to insure the postwar sale of appliances and devices which will operate on either frequency or which can be changed over with minimum inconvenience to the customer.

Pointing out that Edison territory represents 2½% of the total national appliance market and that it is the only 50-cycle district in the U.S., officials gave seven reasons for the change, which has been officially ordered by the California Railroad Commission:

1. To conform to the standard American frequency of 60 cycles.
2. To eliminate customer and dealer inconvenience resulting from two frequencies and the necessity for carrying dual stocks.
3. To obviate the necessity for paying higher prices for non-standard equipment.
4. To eliminate inconvenience and annoyance caused customers in moving from one frequency area to another.
5. To secure the benefits of repetitive manufacture, which does not lend itself to the production of 50-cycle equipment, causing delays and expense to dealers and customers.
6. To provide easier interconnection with other utilities for interchange of power.
7. Now is the opportune time because (1) many plants will rearrange and retool for peacetime production; (2) many appliances and much industrial equipment is worn out and must now be renewed (it can be designed for use on either frequency); and (3) the changeover will provide work for returning servicemen.

In general one area at a time will be converted. Most of the actual work of changing over equipment will be done under contract instead of under force account as was the case when the systems in the cities of Los Angeles, Pasadena, Burbank and Glendale were switched from 50 to 60 cycles some years ago. A post card survey will be made of each section of territory initially. This will be followed by a house-to-house inventory listing the make, model, age and condition of all electrical equipment. Finally speed-critical appliances will be converted by qualified persons ahead of or simultaneously with the frequency change.

A special frequency change department has been established with W. N. Johnson as manager. In discussing the mutual interests of the manufacturers, distributors and retailers with the Edison company in seeing that customers interests are protected in the period between the availability of new appliances and equipment and the actual changeover, Johnson said:

"If the speed of the driven equipment is not too critical, in all probability the 60-cycle equipment will function and give satisfactory performance at 60 cycles while waiting for the Edison system frequency to be changed. In other words, it will operate at 16% under the designed speed. This appears to be more suitable than selling 50-cycle equipment and later operating the equipment at 60 cycles, or 20% over the designed speed.

"After the system frequency conversion, 60-cycle equipment which has been operated at 50-cycle frequency would then operate at designed frequency.

"Obviously the ultimate purchaser will feel more kindly disposed toward any merchandise that will not subject him to the inconvenience of 'out of service' when frequency change takes place in his vicinity. The engineers charged with the work of conversion of the Edison system will have available records of 50-cycle equipment manufactured up to 1941, and what is needed for conversion of these items for use on 60 cycles.

"All the newer sealed-unit type refrigerators will operate equally well on either 50 or 60 cycles, and some of the belt-driven types will require change.

"The accompanying table illustrates the majority of appliances which are considered speed critical and will be affected by the frequency change.

"Dishwashers will require certain changes, as will fans and blowers.

"Radio phonographs will all require change and, if the manufacturer would include the appropriate factory-made conversion parts when shipping new units from the factory, the ultimate consumer would be benefited.

"The adjustments that will be necessary in the present known models of television receivers will be very minor in character.

"Distributors can help in the following ways:

"1. Order all equipment for 60 cycles that will operate satisfactorily on either frequency, and wherever possible request that merchandise be furnished for dual-frequency operation.

"2. Request that manufacturers supply factory-made conversion parts for speed-critical equipment to be operated temporarily in 50 cycles and attach conversion parts to merchandise whenever possible.

"3. Advise dealers and customers about the proposed frequency change and what it means to them in better service — less inventory, fewer mistakes, fewer return trips and exchanges.

"4. Ask the dealers and customers cooperation during the time the fre-

Frequency Sensitive Appliances and Equipment

Domestic	Commercial	Industrial
Washers, principally spinner types	Adding machines	Fans and blowers
Dishwashers	Calculators	Motors
Blowers and fans	Business machines	Elevators
Refrigerators (belt-driven compressor	Electronic devices	Food processing machines
Mixers, food (heavy duty)	Fluorescent lights	Conveyors
Radio-phonograph combinations	Neon sign lighting	Compressors
Television sets	Electric pianos and organs	Centrifugal pumps
Fluorescent light ballasts		
Clocks and range timers		

quency change is being made. It is for the interest and advantage of both.

"5 Notify Edison frequency change department before ordering any large or unusual electrical equipment which is speed critical.

"6. When in doubt about the electrical equipment working satisfactorily on 50- or 60-cycle current, consult the manufacturer and notify the Southern California Edison Co. frequency change department.

"7. With your cooperation and that of the manufacturers, the inconvenience to the ultimate purchaser will be held to a minimum.

"8. Cooperation now on new models will eliminate dissatisfaction later."

While motors are listed under the frequency sensitive equipment and although much motor-driven equipment is frequency sensitive, there are several fundamental factors to be remembered about motors:

1. Most small motors operate satisfactorily on either 50 or 60 cycles.

2. Induction motors, either single of three-phase, run at speeds proportional to frequency. A pulley or gear change is all that is necessary in most cases.

3. Synchronous motors are in exact step with frequency and must be changed.

4. Induction motors designed for 50 cycles have more copper and iron and cost more than 60-cycle motors.

5. Motors marked 50/60 cycles are in most cases designed for 55 cycles.

6. Most important change in going from 50 to 60 cycles is in torque.

7. Normal voltage rating for most motors is 110 or 220 volts. Edison system voltage is 120 or 240 volts.

8. For frequency changes, the following is true: With the same current as before, when voltage corresponds to Edison system conditions, i.e. 120 or 240 volts, frequency raised from 50 to 60 cycles equals 20% change. Torque is 82.4% and horsepower 99%. Actually more current can flow without overheating the motor because with higher speed, there is more fan action to keep the motor cool. Actually under Edison voltage conditions the motor will deliver more horsepower but with some reduction in maximum torque.

9. In case the individual motor torque is insufficient, voltage may be raised by an autotransformer.

10. Single-phase induction motors with centrifugal starting switches must have the spring tightened so that the switch will not open until the proper speed is reached.

11. When the motor pulley is reduced by the ratio of five to six to obtain the same speed, the effective torque at the load is maintained.

Planning Institutes for Business Next

Six-session course in store modernization and display and sales refreshing starts in the fall

SO successful were the Home Planning Institutes conducted by the schools during the past year or two that a similar set of institutes for business men, for retailers and store owners, is being launched this fall. San Mateo, Burlingame and San Bruno, Calif., already have a joint program so well advanced that they will initiate the idea with the opening of schools in September.

To be known as the Business Planning Institutes of California, they are presented through the joint facilities of the bureau of business education of the California State Department of Education and the school district in which an institute is held, in cooperation with the business trade and service associations of the state.

The San Mateo - Burlingame - San Bruno institute, for example, is sponsored by the San Mateo Union High School District and the Burlingame, San Mateo and San Bruno chambers of commerce. Business men of those communities where extreme trade rivalry usually exists, got together for the first time on a joint community project of this type, requested the help of the State Department of Education and, after meetings to work out details, set up a tentative schedule. Of the 100 business people who attended the kick-off luncheon, by invitation, 60 signed up for the six-week course.

The classes will be started Oct. 4 at some school selected by the local committees, one class a week, at which two qualified speakers will be presented. Direction of the work has been placed in the hands of Frank E. Cox, a field coordinator of distributive education, who has been made director of the institutes for the state. He will work chiefly in the northern part of the state, and Robert F. Kurrle will handle similar Business Planning institutes in southern California. The latter hopes to have two in operation with the opening of the fall term.

Preliminary test of the idea was conducted by Cox in Antioch, and then in Woodland, Lodi and Dixon. At Antioch, two lectures were given daily, but these stimulated business men of the community to intensive business planning. At Woodland, Lodi and Dixon, six meetings were held, to test out the subjects and bring forth the natural interests of attending retailers.

As a result of these experiences, the program of subjects developed is one that was found to be of keen interest and value to the business men of the towns. The program for the Burlingame course, for example, will contain:

Plan Now for Modernization, and Planning the Store Front and Modernizing the Interior — as first evening subjects. Second meeting will stress modern lighting and display, with a talk on postwar store lighting and wiring, and one on modern trends in display. Third meeting will deal with interior modernization, air conditioning, insulation, and a talk on financing of such improvements.

Fourth meeting will deal with merchandising control and modern equipment for store operation. Fifth will take up advertising and sales promotion and personal selling. Final meeting deals with community planning and development of a community plan for action. In this respect it is expected that a good many communities will seek to start movements to modernize and improve entire blocks of store fronts and buildings.

To handle the electrical subjects on such a program in northern California, the Pacific Coast Electrical Assn. and the Northern California Electrical Bureau are to furnish speakers. The lighting and wiring speaker is to be furnished by a lighting committee headed by Walter Thompson, Westinghouse Lamp Division. The talks on heating, ventilating, air conditioning probably will be given by Jarad Hill, Pacific Gas and Electric Co.

Among the sponsoring organizations which are furnishing expert non-commercial speakers or programs are the two electrical groups just named and the California State Reconstruction and Re-employment Commission, National Glass Distributors Assn., Producers Council of Northern California: California Retail Grocers Assn. and others. By June of next year, Cox expects that requests from more than 60 cities and communities in the state will have resulted in as many institutes. A handbook for sponsoring groups has been prepared by the bureau of business education, State Education Department.

● APEX, says A. C. Scott, former Westerner now vice-president of sales, will make washers, ironers and vacuum cleaners, will have standard models and automatic washer, portable and cabinet ironers and floor, hand and cylinder vacuum cleaners.

DEALERS—Roll Your Own Planning—VI

More case studies of some dealers who HAVE planned

MORE evidence of the value of planning and of getting started in the operation of those plans is to be found in the experiences of three electrical dealers in towns of Martinez, Pittsburg and Antioch, Calif. Even with adverse conditions, these dealers not only survived the restrictions of the war but are on their feet and in motion after setbacks that might have daunted less determined planners.

Take the case of colorful R. J. Hersey, (pictured above looking over the plans for his new store from his temporary location in an old abandoned winery) of Martinez. The Hersey Electric Co. has occupied a fine central location in the center of Martinez business district for 23 years, but the property owner sold the place and Hersey had to move. With foresight he had bought a corner vacant lot nearby and had his plans all drawn. The foundation was poured even, but there he had to stop because of lumber.

Only place in town he could get to store his stock and from which to conduct his contracting business was an abandoned winery. There he moved, built some bins which can be used at his new place, and in his own home workshop he has been making display counters and racks from designs he found in one of the appliance manufacturers' planning guide books.

His new building will be 50 x 60 ft., with a second story in the center, 20 x 50. It will have a large appliance display, fixture display, radio and phonograph rooms and a shop for the contracting business.

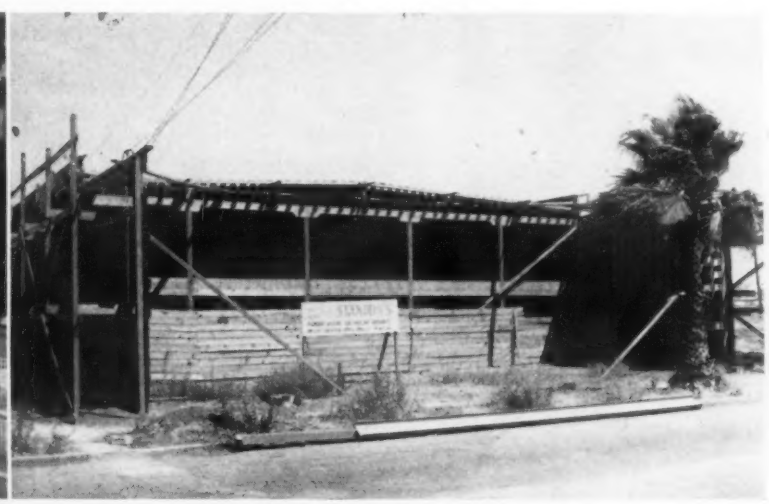
OR take the case of Garrow Home Furnishers, in Antioch. Garrow sold his stock of appliances long ago, but managed to keep a good supply of furniture and lamps. At the rear of his store, he operated a laundry and dry cleaning plant. The military commandeered its entire production and later took over the machinery. He was left with a large piece of factory property and nothing to do with it but pay taxes.

Attending a Business Planning Institute lecture, Garrow caught the idea to transform the whole block in which he is located. The old laundry will be removed, he says, to make way for a new electric market, a place devoted to new appliances and modern in design to match. He has plans ready and is all set to go.

IN Pittsburg another dealer has started to put his plans into practice. R. C. Stanton runs an electrical and plumbing business. He outgrew his place at 149 E. Third St. During the war when appliances were not available, the plumbing and electrical wiring business kept him fully occupied, yet he made plans for the future. Buying a piece of property on the edge of town on a main highway at 1185 Railroad Ave., a new building is on its way up. Materials were hard to get, and so the warehouse and shop part went up first at the rear of the property. The office was also put in.

Now, as more materials become available, the front of store will take shape. The electric kitchen will be under the balcony; major and traffic appliances will be up front. A priority prospect list of 700 names is ready as a result of advertising on which his salesmen can begin.

In front of the half completed office and warehouse portion of his new place stands R. C. Stanton, Pittsburg



Sterling Steps Out

Converts entire basement for appliance center, gives hungry public a preview

TIMING is one of the marks of the professional. Always an enterprising merchant of home appliances, Sterling Furniture Co. (Bunster & Saxe) of San Francisco timed the opening of its new appliance center with uncanny precision, a week ahead of Japan's surrender. A public hungry for a glimpse of new and shiny electrical wares flocked into the store to preview the appliances they could not yet buy, and to learn from movies, lectures and demonstrations, some of the labor saving benefits they aspire to own some day. About 5,000 visited the department in four days. Other crowds were stopped by the attractive window display with its "you can't buy these now, but we'll take your order" signs.

The entire basement has been remodeled for the new appliance department, the ceiling acoustically treated and bright, light colors used for decoration. Formerly the appliances occupied a small part of the rear main floor. Now an attractive, inviting wide curved staircase leads store visitors easily down to the model kitchen at its foot and to a wide expanse of appliance displays and demonstrations. The front can be screened off for a small auditorium for lectures, food demonstrations and for entertaining club and prospect groups.

Miss Mary O'Brien, formerly of Barker Bros., Los Angeles, heads a new "Home Advisory Bureau", which gives advice on decorating, kitchen planning, meal planning, entertaining, laundry methods, gardening, barbecuing or anything connected with home operation. Her tool kits are a group of well arranged scrap books which she has compiled from magazine articles, pictures, manufacturers' literature. Seated at a table, prospects poured over these scrap books all during the opening week.

Nearby at a desk of its own was the big prospect priority book, in which those interested in specific appliances leave their names and addresses to be notified when new appliances arrive. Near this center too, the wire recorder was used for a daily appliance quiz, both to demonstrate its operation and to create interest.

While the present model kitchen is complete, it will be done over with modern packaged kitchen units, when these become available. Asked where he had obtained so many appliances even for display and demonstration, Guy Farwell, buyer, only smiled and declared it a military secret.

For the opening week, tied in with the store's 77th anniversary, full-page ads invited the public to the new department. A full program of special events was scheduled for the first four days. Advertising is being continued as a follow-up of the opening, stressing advance orders.

"If only we could sell something to all these people," said Sterling Furniture executives, pleased by the good crowds which came in just for a glimpse of the new appliance displayed and demonstrated but not for sale. Top: W. O. Saxe, owner and merchandise manager; Guy Farwell, appliance buyer, and L. C. Myers, general sales manager. Next: Miss Mary O'Brien, in charge of the home advisory department, showing scrapbooks she has compiled to soldier and wife. Below that: The prospect and priority book being signed. Auditorium at the rear, and scrapbook center at right. Next to bottom: A Navy three-striper and his family look over a new electric range. Bottom: Miss Lois Ferris, Westinghouse home economist, demonstrating the Laundromat to big crowds

War Surplus Materials Available Now

John S. McCullough, Jr.
Manager, RFC, San Francisco

IT IS safe to assume that the electrical trade is in much the same state of confusion regarding the sale and disposal of government surplus property as is industry generally.

Anticipating the complex problem which government surplus would create, the Surplus Property Act was drawn up and adopted so that the chaotic conditions which followed the first World War would not be repeated when World War II had been won.

In general the act provides for the orderly disposal of surplus by established government agencies with a maximum return to the taxpayer and with a minimum dislocation of normal trade channels and distribution structures.

So far as the electrical trade is concerned, surplus government property will be sold through established dealers in inventories of consumer classification and direct to consumers if the goods are of producer-capital goods character.

In the former, consumer category, the Department of Commerce has been designated as the selling agency, while the Reconstruction Finance Corporation will deal in the producer-capital goods that come into surplus inventories.

Although it might appear that Uncle Sam has gone into direct competition with those in the electrical industry, it is well to bear in mind that Uncle Sam's surplus inventories provide the only visible source of supply at this time.

It is admitted that the surplus sales agencies are sworn to an aggressive sales policy which will incorporate all the recognized sales promotion techniques, but that is in the interest of the taxpayers who are anxious to have the highest return on their invested capital.

In the consumer item categories, it is not unreasonable to suggest that dealers and wholesalers will welcome the opportunity to obtain goods for meeting the current pent-up demand. Many firms already have made purchases, and stores all over the nation are presently offering goods which they have obtained from the Department of Commerce surplus inventories.

By the same token, electrical manufacturers have seen in the electrical goods categories to be sold by the RFC a potential threat to their manufacture-distribution structure.

Many have expressed the opinion that they could see no reason for purchasing government surplus items. Some claim that they have identical or similar items in their own warehouses and they have been reluctant to absorb surplus items.

However, when a full realization of the over-all aggressive and determined sales policy of all surplus agencies is known, Reconstruction Finance Corp. has found even some of the nation's leading electrical concerns buying surplus to remove it from a position of competition.

Some firms even show an eagerness to utilize surplus goods for conversion to peacetime items, while others have bought goods which they recondition and modify, and, in so doing, stabilize their skilled labor situation during the transition period from war production to peacetime production.

As for the way in which purchases can be concluded, all agencies are now staffed with able salesmen and experienced technicians to aid and advise prospective buyers. District offices are maintained in Seattle, Portland, San Francisco, Los Angeles and Salt Lake.

Many of those in the electrical trade know Jack Edwards, who heads up the electrical unit in the Surplus Property Division of the Reconstruction Finance Corp. in San Francisco. Edwards is in charge of a capable group, including Sid Wallace, whose long experience in the electrical trade includes specializing in X-ray equipment sales.

This unit of the San Francisco RFC office, which is typical, is fully prepared to answer personally any question and to counsel prospective buyers on condition or conversion possibilities of any electrical equipment coming into the RFC surplus inventories.

Disposal agencies are currently issuing frequent offering lists to prospective buyers. Those interested are urged to notify the agencies of the desire to be on a mailing list and agencies will then forward a categorical selection list to be filled out by the prospective buyer. This selection list will provide information for the offering list units so they may send information of items for sale if, as and when those items come into surplus.

All those in the electrical trade will want to obtain information on categorical offerings by the RFC, for RFC can and does sell in any quantity, large or small, to anyone, any firm or any organization.

Likewise, many of the items offered by RFC are not electrical items but are at the same time items in which the electrical trade should be interested.

It goes without saying that the electrical trade is interested in motors, fuses, cable, wire, transformers and insulation material. Likewise it is reasonable to assume that handling equipment, certain machine tools, specialized machinery, metal stocks and even rubber and wood items might be of interest to those in the electrical trade.

In dealing with the RFC, the trade will find that most items are offered on a price tag basis. This pricing is the result of a survey of current markets, condition of surplus and a healthy appraisal system. Trade allowances are currently being formulated and such RFC properties to be sold as manufacturing plants and sites are open for negotiated sale.

Inspection-before-purchase privilege prevails whether the buyer is in area served by the Seattle, Portland, San Francisco, Salt Lake City or Los Angeles office. At the moment, however, sales-display centers are still being established and this program can only expand as facilities become available in the several communities that have been so crowded with war goods destined for the combat area.

Once everyone realizes that the surplus property disposal program has been carefully planned to stimulate close cooperation between buyer and seller so that a high percentage of saving could be obtained for the taxpayers, it is believed that all parties to the plan will set out to establish an enviable record.

It has been the experience of the RFC that the biggest interest in the electrical industry has seen fit to capitalize on the program and, though proud of this relationship, RFC stresses that its offices for surplus disposal are open to everyone—the big buyer or the individual purchaser.

● AN UNUSUAL LINE for an appliance store is announced by Charles R. Rogers, owner of Modern Appliance Co., with dealer stores at San Mateo, Burlingame, Redwood City, and a wholesale division at the Western Merchandise Mart, San Francisco. Rogers announced that he has been appointed distributor for northern California for Truscott Boat & Dock Co.'s power cruisers and sail boats.

ELECTRICAL WEST

McGRAW-HILL COMPANY OF CALIFORNIA
68 POST ST. SAN FRANCISCO 4

The all-industry magazine of progress, established 1887 and incorporating the "Electrical Journal," "Journal of Electricity, Power & Gas" and "Journal of Electricity." Contents Copyrighted.

EXECUTIVE AND EDITORIAL STAFF

James H. McGraw, Chairman of the Board
George C. Tenney, President and Editor
W. A. Cyr, Associate Editor
Wayne Snowden, Engineering Editor
(In military service)
Walter C. Heston, Engineering Editor
Peggy Boyer, Assistant Editor
R. A. Balzari, Publishing Counselor
Roy N. Phelan, Manager
John Cootz, Typography

ABP

MEMBER AUDIT BUREAU OF CIRCULATIONS

ADVERTISING REPRESENTATIVES

Ralph H. Flynn, 330 W. 42nd St., New York 18
William B. Heaps, 520 N. Michigan Ave., Chicago 11
Roy N. Phelan { 68 Post St., San Francisco 4, DO 4600 / 621 S. Hope St., Los Angeles 14, MI 3873
Stephen H. Babcock, 2980 Penobscot Bldg., Detroit 26

EDITORIAL ADVISORY BOARD

UTILITIES: R. E. Fisher, Vice-President in Charge of Public Relations and Sales, Pacific Gas and Electric Company, San Francisco; J. A. Hale, Vice-President, Utah Power & Light Company, Salt Lake City; Glenn L. Jackson, Vice-President and Commercial Manager, The California Oregon Power Company, Medford (in military service); Frank McLaughlin, President, Puget Sound Power & Light Co., Seattle; L. T. Merwin, President, Northwestern Electric Company, Portland; W. C. Mullendore, President, Southern California Edison Company Ltd., Los Angeles . . . MANUFACTURERS: J. H. Pengilly, Executive Vice-President, Square D Company, Los Angeles (in military service); C. A. Dostal, Pacific Coast Manager, Westinghouse Electric & Mfg. Co.; A. S. Moody, Northwest Manager, General Electric Company, Portland... WHOLESALERS: J. I. Colwell, Northwest Manager, Graybar Electric Co., Inc., Seattle; N. W. Graham, Graham-Reynolds Electric Co., Los Angeles . . . CONTRACTORS: Lloyd Flatland, Globe Electric Works, San Francisco; S. G. Hepler, Arrow Electric Co., Seattle . . . DEALERS: H. H. Courtright, President, Valley Electrical Supply Company, Fresno; J. C. Chamberlain, Sec'y-Mgr., Bureau of Radio and Electrical Appliances, San Diego, California

Light Rides Again

LIGHTS *have* come on again, all over the world. The "when" in that song is here, *now*. Even in bomb-blasted Europe and Japan, the light may be the dim flicker of candlelight where electric systems have been wrecked, but it is *light*, and that is symbolic of a different kind of world than the barbaric one to which all had been plunged by war. In America, almost the full blaze of color and vivacity of prewar commercialized light has returned.

Just as lighting was the first general usage for electricity, it leads again in being the first postwar use for all purposes. While curtailed in production for civilian uses, the making of lighting equipment never ceased. If anything it was accelerated beyond anything in history before. This productive capacity turned to peacetime lighting should put on the market almost immediately a variety and wealth of lighting materials to sell.

Particularly into those long-denied places, the home and the store and the ordinary office, much wanted but unobtainable lighting improvement can now flow. The lessons learned from high production under ample levels of illumination can be applied to the home, office and store. New light sources and devices, obtainable only on high priority before, are released for all who want them.

And therein lies the job of the future. No longer denied, the public may not want. Salesmanship must return. Training and engineering are needed. These challenge the industry that began with light.

The Challenge of Peace

THE challenge of peace in August 1945 that confronts American industry is but little different from the challenge of war which confronted industry in December 1941. Certainly the responsibilities are as great and the opportunities are greater. America girded for war to protect the democratic rights of freedom-loving people against the tyranny of dictators. To that cause industry contributed greatly. American factories were the true arsenals of democracy. In all of that the electrical industry contributed in fullest measure.

Now it becomes the lot of American industry and business to insure the maintenance of the inalienable rights of a free people in a free business economy. This is a crucial test in a world which already is flaunting the doctrine of international brotherly love and humanitarianism that activated the great San Francisco conference. Success or failure will certainly determine the course of American life in the future; it may affect the whole world. This is a challenging responsibility and one in which industry cannot fail.

Even so there are those who express fears over the tests of peace, especially over the suddenness with which they came. The quick capitulation of the Japs certainly switched reconversion from the talking to the action stage. Many people and many organizations from Congress down, were caught with the blissful belief that there would be a gradual transition stage from wartime production and a wartime economy to peacetime conditions. The rude awakening has been good. For one thing it cleared the scene quickly of the multitude of controls which have caused business and industry to curse and sweat. That in itself was a real blessing.

The days of reconstruction and reconversion which lie immediately ahead are going to test the ability of industry, labor and government to work together for the common welfare. The opportunities are limitless for the application of intelligent effort. Certainly the stakes are worth the effort. The electrical industry knows how bright its own horizons are. Millions of new homes to be wired; tens of millions of new appliances to be sold; new equipment, new processes, new lighting, new electrical applications to be sold to offices, stores, factories, farms and homes. Our industry alone has a real opportunity to lead into an era of prosperity.

Yes, the test of peace will be great and meeting of that test will have a profound effect on future American life. But it is safe to say that the same courage, persistence, work and cooperation that won the war, can and will win the peace.

Threshold of the Atomic Age

WHEN the atomic bomb exploded over Hiroshima, there was ushered in a new industrial era more pregnant with possibilities and more profound in its implications on humanity than the teakettle experiments of James Watt or the kite and key observations of Benjamin Franklin. Even so, in the light of our present knowledge of atomic fission and atomic power, we would not recommend that any investor sell his securities in an operating light and power company to purchase a share in an atomic power plant. And by the same token we would not expect present personnel nor returning servicemen to foresake the electric utility field because of the immediate threat of obsolescence.

The same scientists who developed the atomic bomb say that it will take years, if not decades, to harness and control the explosive forces which brought such a quick end to the Japanese war. In the meantime, however, it would be foolish to overlook the potentialities of this source of energy and to ignore its ultimate possibilities.

From the extensive discussion of atomic power which appears elsewhere in this issue, we learn that if it were possible to explode every atom in a pound of U235, the heat released would total 37,000,000,000 B.t.u. Thus a pound of uranium 235 as a fuel would be equivalent to 1,370 tons of 13,500-B.t.u. coal. By converting this heat into steam, sufficient energy could be obtained to generate 2,700,000 kwh. of electrical energy in a modern turbo-generator plant with a conversion efficiency of only 25%.

Equally fantastic and intriguing, quantities of low-temperature heat are released due to atomic fission in the production of plutonium from uranium in the carbon pile process employed at Hanford. However, as yet there is no information available as to the economies involved. Obviously the $2 billion investment in the atomic bomb projects was a good wartime expenditure, for it ended the war. If atomic power is only to supplant fuel in the generation of power, then the savings involved are relatively small—on the order of 2 to 4 mills per kwh. We can safely say that the obstacles to the beneficial use of this power are not insurmountable though they be prodigious and involved.

Of immediate concern and importance is the sober lesson that the atomic bomb development has taught the American people. The best brains and the total resources of the country were harnessed on a project that required the maximum in research, persistence and concentration of effort. Only the U. S. had industrial plant capacity large enough and sufficiently efficient to undertake the task. This huge effort, involving the utmost cooperation between scientists, government, industry—of themselves only people—actually won the war. We can humbly hope that the same effort may ultimately put atomic power to useful work for humanity.

A War Job Well Done

AMONG the industries missing when the medals were passed out for wartime contributions were the railroads and the electric light and power companies. Both deserve high places on the honor rolls. Just so that the record will be clear and complete we want to set forth for posterity a few of the electrical industry's wartime accomplishments. No better index could be used than the records for the 1916-18 World War and the 1941-45 World War. Here are the comparisons:

In 1944 the light and power companies served four times as many customers as in 1917. The average use of electric power in the home increased more than four times in that time. As contrasted to 1917, a 1944 kilowatt of generating capacity produced more than one and a half times as many kilowatt-hours. The amount of productive capacity in 1944 was almost four times greater than in 1917 and the total amount of power supplied was six and a half times greater. The cost of electricity in the 1944 home was less than half the 1917 cost. The taxes paid by the light and power companies were 23½ times greater. In 1917 there were some power shortages; in 1944 and, for that matter, during the entire war not only was there enough power to meet all needs, but there was a surplus as well.

Here is a balance sheet that the entire electrical industry can point to with pride. And it is graphic assurance that these same organizations will go forward to greater peacetime accomplishments.

INDUSTRY must proceed boldly into the reconversion era. The initiative, the resourcefulness and the plain guts displayed in those dark days which followed Pearl Harbor are the only tools we have to use. A forward approach is the only way to tackle the problems ahead. It also is the only way we can avoid and minimize many of the things which those of timid hearts fear are likely to arise. I want to compliment President Truman on the initiative and action he has shown. We in industry must all do the same. I know as well as you that some materials and component parts will be short. I know that all are faced with perplexing and baffling problems to which there is no ready answer. But the best way to correct these problems is to get the industrial machine in motion.—Ira Mosher, president, National Association of Manufacturers.

State Association

Contractors meet in Fresno to discuss possibilities

TO discuss the advisability of forming a state association, electrical contractors from both northern California and southern California met at Hotel Fresno Aug. 18. Although members of both Los Angeles Chapter and Northern California Chapter NECA were present, the meeting was not sponsored by either group. It was rather to discuss the feasibility and the need for a state association to handle state-wide matters.

Chairmanship of the meeting was divided between the two groups. Tom Harris, H. S. Tittle Co., San Francisco, acted as temporary chairman in the morning session and Herbert Evans, Nicholas Electric Co., Hollywood, was chairman for the afternoon meeting.

A committee was elected to work out details for such a state-wide organization and to report at a future meeting, probably in January. To this committee were named L. G. Jeffrey, Electric Construction Co., Fresno; Walter Vance, Jr., Pacific Electric Motor Co., Oakland; Tom Harris; Norman Ferguson, California Electric Works, San Diego, and J. C. Schamel, Schamel Electric Co., Los Angeles.

In this brief one-day session other subjects discussed were: direct sales to industrials and wholesaler and manufacturer policy, state-wide apprenticeship program, the state contractors license law, disposal of surplus materials through the RFC, remanning of inspection departments and various postwar subjects in which contractors may be interested.

Roy Butcher, San Jose electrical contractor, a member of the state contractors license board was unanimously endorsed for reappointment by the governor and recommendation to that effect are to be made by contractors.

Discussing a master agreement, which is to be used as a guide and a model for the making of local agreements, Tom Harris, chairman of the committee from the Northern California Chapter, NECA, which worked out such an agreement, recommended similar action in the southern part of the state. It was agreed that neither group would approve labor agreements without consulting the other in order that uniformity of rules and working conditions might be obtained throughout the state.

Opposition was voiced to the proposed Murray-Dingle Bill now before Congress for the creation of work.

The state-wide meeting of electrical contractors early next year was advocated and unanimously voted upon. No permanent organization was set up in the Fresno meeting, that being left to the development of this special committee appointed for that purpose.

D. W. Atwater demonstrates new Westinghouse lamp developments to a San Francisco meeting before going to preview new Disney film on Better Light

Atwater Previews

Come to the West Coast to preview and pass upon a new Disney motion picture being produced for the Better Light-Better Sight Bureau, D. W. Atwater, now manager of the consolidated illuminating engineering and commercial engineering departments of Westinghouse Lamp Division, Bloomfield, N. J., was called upon to address several meetings in San Francisco and Los Angeles.

As member of the council of Illuminating Engineering Society, he was asked to meet with the Northern California Section, IES, on the evening of July 25, San Francisco. He outlined many of the projects now before the council, such as the handbook, the research fund, new domestic lighting performance specifications which will replace the former IES lamp standards. He answered questions as to policy, such as the determination of the range of the spectrum to be covered by the activities of the society. He concluded by showing slides indicating the trend in light sources and applications of fluorescent to many types of lighting requirement.

To a meeting arranged by Westinghouse, at Pacific Gas and Electric Co. auditorium, July 26, attended by dealers, contractors, wholesalers, engineers and utility men, Atwater gave an illustrated and demonstrated talk dealing with the newer light sources and their applications to all types of lighting. On Aug. 1, Atwater gave his talk at a similar meeting in Los Angeles at the Southern California Edison Co. auditorium.

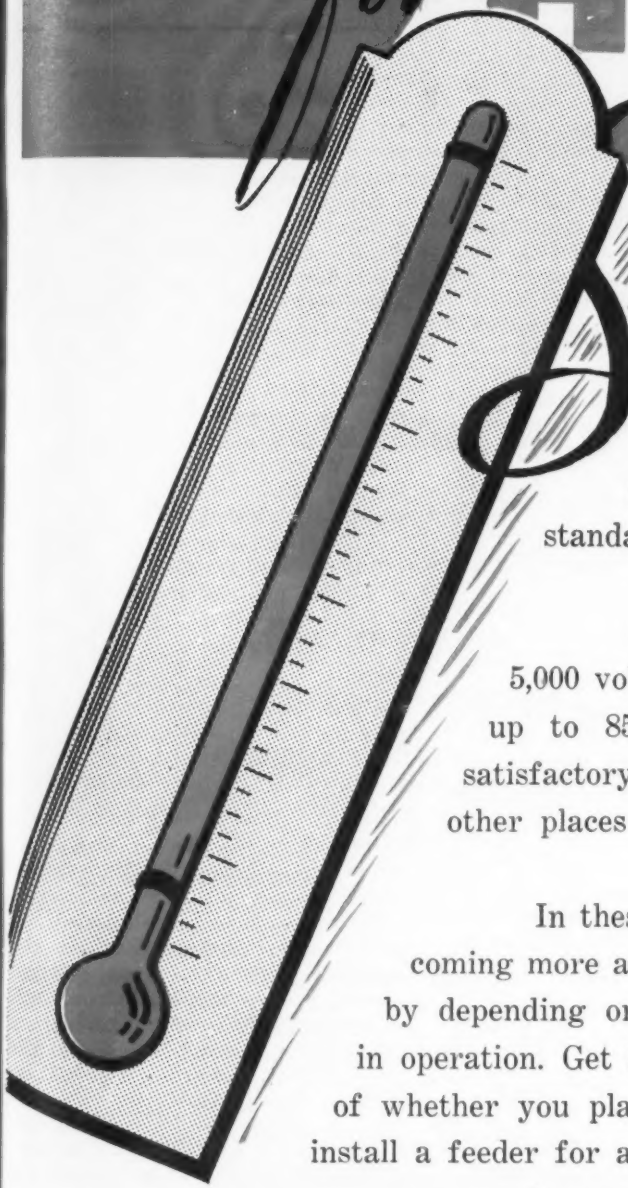
● DATES for the Rocky Mountain Electrical League's Fall conference and election of officers have been set tentatively for Oct. 25, 26, 27. Although the event is scheduled as a round-table meeting confined to high-priority business matters, relaxation of travel bans and the lifting of gasoline rationing suggest that attendance will be the largest since 1941. A. S. Anderson, G-E, has been named convention chairman by President McCammon of the Rocky Mountain league.

● PLANS to reintroduce a licensing law in British Columbia are being made by the Vancouver Electrical Assn., electrical contractors organization. A previous movement to enact such provincial legislation was unsuccessful but members feel that was chiefly because of war conditions.

● GREELEY chapter of Rocky Mountain Electrical League has been reactivated and is again functioning. At a recent election, Frank Foster was elected president and R. C. Macpherson secretary-treasurer.

East Bay Electric Club, Oakland, wound up its year with a reception to past presidents and inauguration of its new president, Harry Leninger, Pacific Gas and Electric Co. Among the special guests for the occasion were George Tenney, editor, ELECTRICAL WEST; C. N. Thrams, president, Associated General Contractors; C. W. Darwin, secretary, Builders Exchange; and Dr. John F. Slavich, mayor, Oakland.

Simplex Varnished Cambric Cables for Hot places



Simplex Varnished Cambric Cables are ideal for use in places where heat deteriorates other types of standard insulations.

Simplex Varnished Cambric Cables rated for 5,000 volts and less can operate safely at temperatures up to 85°C. (185°F.). This makes them particularly satisfactory for mill or factory distribution systems or in other places where heat is an important factor.

In these days when the needs of reconversion are becoming more and more important, don't handicap your plant by depending on old or inadequate cables to keep your plant in operation. Get Simplex Varnished Cambric Cables regardless of whether you plan to completely rewire your plant or merely install a feeder for an addition.

Simplex Wire & Cable Co., 79 Sidney Street, Cambridge 39, Mass.

Simplex WIRES and CABLES

Maintain Safety

EMEA hears experts tell of electrical precaution

SAFETY, as related to the electrical industry, was discussed at a recent dinner meeting of the Electrical Maintenance Engineers Assn. of Southern California. Three speakers handled various phases of the subject.

O. K. Jones, chief electrical inspector, department of Building & Safety, Los Angeles, presented statistical reports on fires caused by faulty wiring. In all cases, he said, these could have been avoided, if the installations had been made by qualified electricians. He expressed the opinion that the time might not be far distant when all journeymen electricians would be required to pass examinations and be licensed.

Frank Short, electrical engineer, Industrial Accident Commission, gave a short talk on the causes of many accidents, which in practically every instance were due to negligence. He ably answered a barrage of questions hurled at him after his talk.

A. W. Turner, safety engineer, Southern California Gas Co., was the last speaker and, although the hour was late, he held members to their seats by telling how to sell management and personnel the idea of reducing accidents. He advocated the term, "work control" in lieu of "safety" in promoting cooperation between management and personnel in accident prevention.

This meeting concluded the series of lectures illustrated by sound slide films on electronics, presented by John Fiske, Westinghouse Electric Corp.

At the previous meeting, George Pierce, Leo J. Meyberg Co., presented David Dyas, who gave an illustrated talk on *Fiberglas Insulation*. He first presented a motion picture describing its manufacture and many of its uses, then told specifically the electrical industry values offered by this material as insulation. He listed and discussed in turn the high temperature resistance, high tensile strength, good space factor, resistance to oil and moisture and corrosive vapors, moisture resistance, high thermal conductivity and dielectric properties. Combined with some of the new silicon resins, even higher temperature resistance may be expected.

A new feature of the EMEA meetings, initiated by Clarence Miller, Western Precipitation Co., its president, is a science and mechanics news broadcast at each meeting, conducted by Henry Bush, Littlejohn-Reuland Corp., and Henri Ledeboer, Aerojet Engineering Co., and known as "Hank and Hank, Electro-factists." — *Henry Bush, publicity chairman.*

Hank and Hank, EMEA Electro-factists

NW Inspectors

Northwestern electrical inspectors plan to hold their annual meeting Sept. 24-25, at Longview, Wash., according to W. L. Gaffney, secretary, Northwestern Section, International Association of Electrical Inspectors. Longview was selected because its hotel facilities are ample and travel to it from most of the cities in the area covered by the section will not be far. Meetings are to be held in the Monticello Hotel.

Chairman of the meeting committee is Joseph H. Krivanek, Krivanek Electric Co., Longview, and president of the Southwest Washington Electrical Contractors Assn. Program of the meeting will be entirely business, with annual elections, committee reports, and what time is left devoted to study of the article committee reports for the revision of the 1940 National Electrical Code.

Flash

Dates for the two meetings of the Southwestern Section, IAEI, have had to be changed because of the meeting of the Electrical Committee, NFPA, in Chicago, Oct. 8, for Code revision. The Los Angeles meeting for inspectors in southern California, will be on Sept. 19, at Edison auditorium. The northern meeting will be in PG and E auditorium, Sept. 21, H. L. Gerber, secretary, announces. Programs of both will discuss major Code revisions.

Honorary membership in the Electric Club of San Francisco was presented to Henry Bostwick, who retired as San Francisco division manager, Pacific Gas and Electric Co. after 41 years service. Bostwick had been president of the Electric Club in 1919. Earl Fisher, also a past president, made the presentation.

Talks of Ballasts

An extra meeting of the Southern California Chapter, IAEI, was held at South Gate, July 11. Kenneth Howard, city electrician, and C. D. Palmer, electrical contractor of South Gate, acted as hosts. Past Chairman I. E. Bartlett, Inglewood city inspector, presided in the absence of Jesse Ross, chairman, San Bernardino.

Aside from inspector problems discussed during the meeting, talks were heard from Leonard Hobbs, assistant general manager, Smoot-Holman Co., a member of the Lighting Fixture Advisory Committee, WPB., who told of the then status of the fluorescent fixture situation. He talked also of standards for such fixtures, particularly as to temperature rise in ballasts, and he warned that germicidal lamps should be properly shielded.

Walter C. Smith, General Electric Co., addressed the afternoon session giving his talk on wartime developments in the electrical field. (See ELECTRICAL WEST, June 1945, p. 91.) A. I. Benedict, engineer of lighting, San Diego Gas & Electric Co., spoke on *Why Worry About Power Factor?* H. C. Rice, Southern California Edison Co., told of plans of the postwar wiring committee for rewiring of homes skimped during the war shortage of materials.

Utah Reorganizes

Utah Electrical League becomes the Intermountain Electrical Assn., following new articles of incorporation adopted by the members unanimously at a recent meeting in Salt Lake City. The new organization supersedes the Electrical League of Utah and enlarges the scope of its activities. Not only will it function in Utah, where its chief activities were centered largely in Salt Lake City and Ogden, but now will extend into part of Idaho.

Increased membership will include many more electric appliance dealers, and chapters of the organization will be established in all the larger population centers. Thus the mass promotional facilities of the association will be made available to a larger number of dealers over a wider area, under the new organization.

Continuing as a non-profit organization, the purposes and objectives of the association are stated in the articles of incorporation as "at all times to foster, promote and encourage the industrial, commercial and social welfare of the members thereof and to advance and protect the interests of the public in all matters pertaining to the electrical industry."

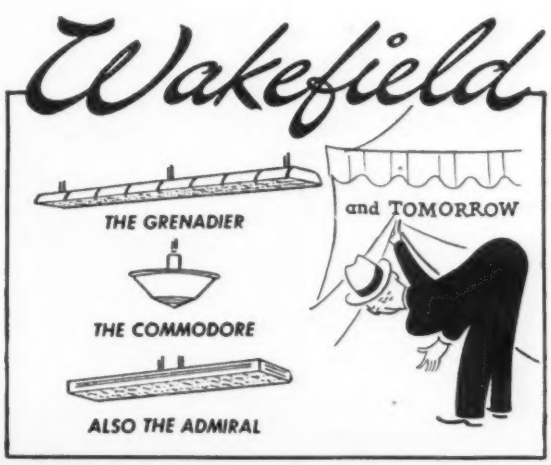
Office Problem:
Paper work volume increasing but errors increasing, too! Management question—how can work be handled with fewer errors?

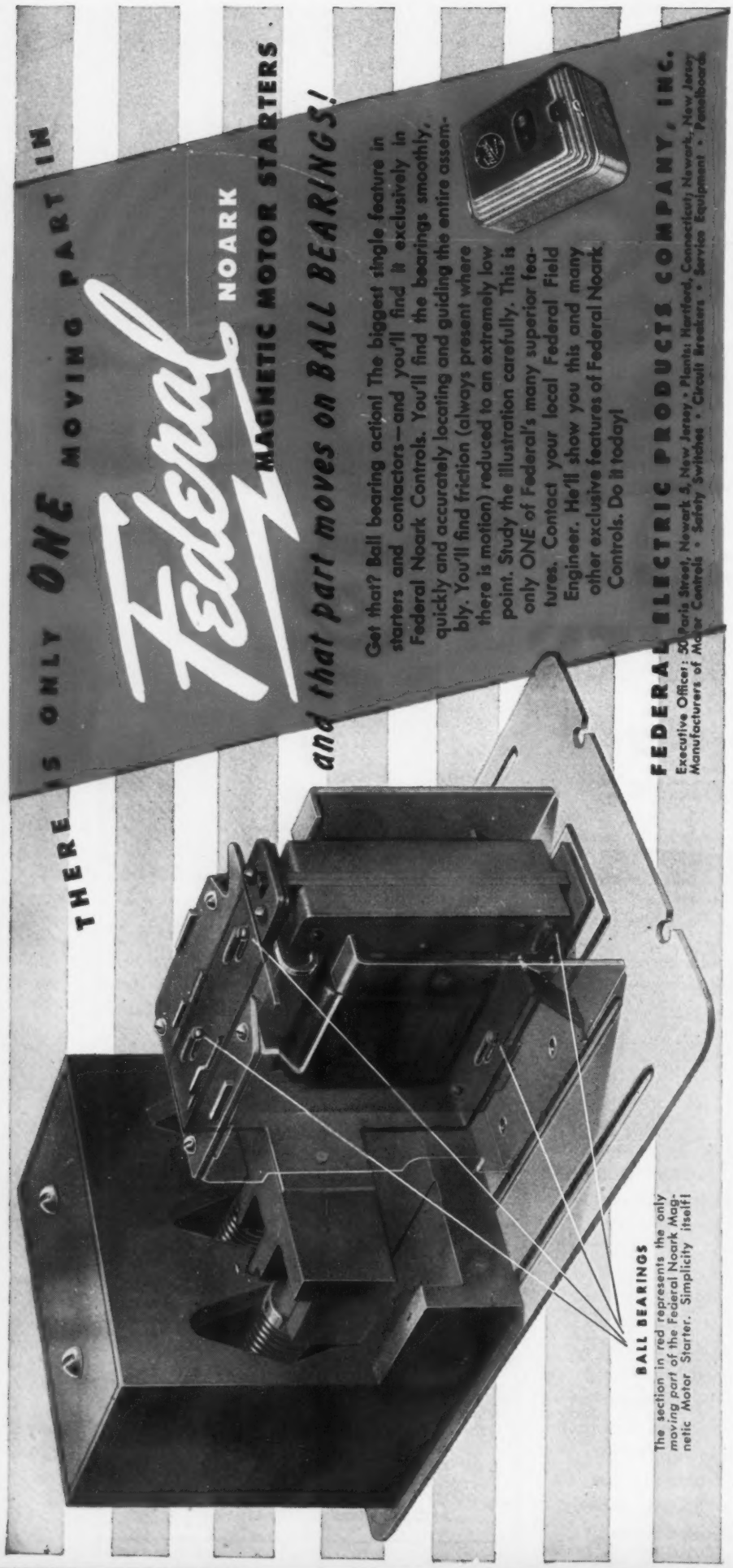
Indicated Solution:
Better lighting . . . but . . .

Limitations:
Rewiring difficult or impossible because of reinforced concrete ceilings. Outlets inadequate in number. Heavy beams that complicate structural changes.

How It Was Solved:
Wakefield was asked to make recommendations for better lighting. You see the result above. Continuous rows of GRENADIERS (PG2488) provide more light on work and better light throughout the office. (Properly lighted walls and ceilings, plus light on work, mean greater eye comfort, less eyestrain.) GRENADIERS make it easy for existing outlets to handle the job without a "forest of rewiring" because *they provide their own wireway to carry feed wires.* Wakefield's adjustable hangers facilitate installation; make small ceiling irregularities no problem. Result: six months later an average of 35 footcandles on desktops.

Perhaps there's a suggestion in this for you and your customers. Wakefield will be glad to work with you on lighting for office or drafting room. The F. W. Wakefield Brass Co., Vermilion, O.




THERE IS ONLY ONE MOVING PART IN
Federal NOARK MAGNETIC MOTOR STARTERS
and that part moves on BALL BEARINGS!
Get that? Ball bearing action! The biggest single feature in starters and contactors—and you'll find it exclusively in Federal Noark Controls. You'll find the bearings smoothly, quickly and accurately locating and guiding the entire assembly. You'll find friction (always present where there is motion) reduced to an extremely low point. Study the illustration carefully. This is only ONE of Federal's many superior features. Contact your local Federal Field Engineer. He'll show you this and many other exclusive features of Federal Noark Controls. Do it today!
FEDERAL ELECTRIC PRODUCTS COMPANY, INC.
Executive Office: 50 Paris Street, Newark 5, New Jersey • Plants: Hartford, Connecticut; Newark, New Jersey
Manufacturers of Motor Controls • Safety Switches • Circuit Breakers • Service Equipment • Panelboards
BALL BEARINGS
The section in red represents the only moving part of the Federal Noark Magnetic Motor Starter. Simplicity itself!

Clearance for Shows

Manufacturers and distributors planning product showings in the near future in San Diego may be interested in the proposal of the Bureau of Radio & Electrical Appliances of San Diego whereby that organization has offered to act as a clearinghouse and booking agency to avoid the conflict of more than one important product showing in that city at the same time.

Under the bureau's proposal, made by Secretary-Manager J. Clark Chamberlain, product representatives desiring to stage a San Diego dealer meeting would simply notify the bureau of their intentions and this date would be "claimed" if no other applicant had previously taken it. A telephone or written inquiry would disclose just what dates are open so that dealers handling more than one important line would not be faced with the prospect of having to attend more than one meeting on the same night.

Home Show

A Construction Exposition and Home Show will be presented to the public of southern California early in the spring. It will be the joint effort of a large group of interests in the construction industry, headed by the Los Angeles Chamber of Commerce and its construction industries committee. The show will be held in a large auditorium and surrounding areas. Model homes and gardens will augment the interior displays.

Eight construction contractors associations join with the chamber of commerce in sponsoring the event, among them the Los Angeles Chapter, National Electrical Contractors Assn. A corporation is being set up to finance and to handle the project. Exhibits will feature appliances, as well as new building materials, and methods and will be designed to stimulate new home construction as soon as possible.

● American Washer & Ironer Manufacturers' Assn. has opened new headquarters at 111 W. Washington St., Chicago 2. Allyn H. Noelke is executive secretary.

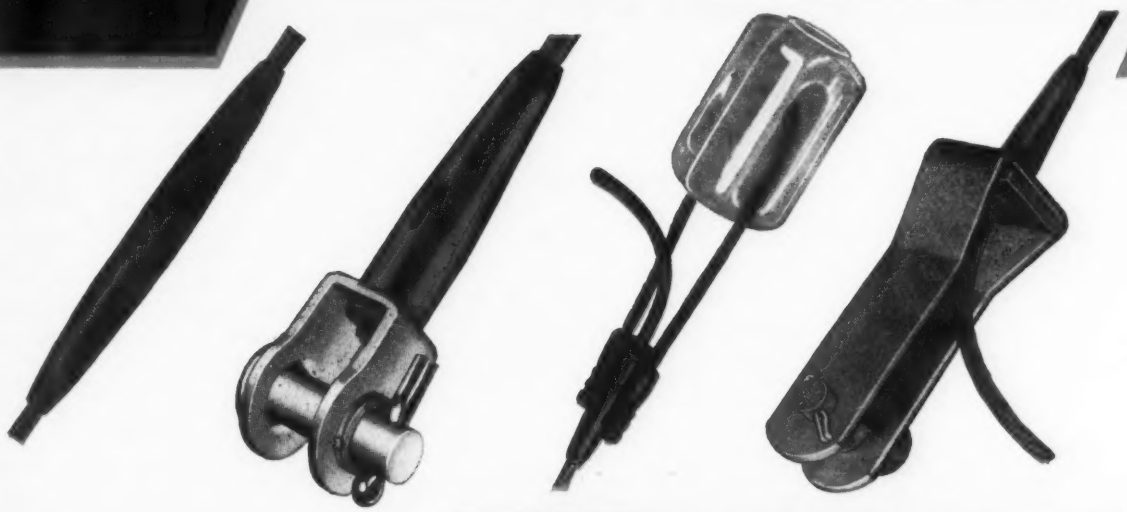
San Francisco Pot and Kettle Club held its annual elections recently and advanced John P. Loughman, H. Baker Co., to presidency. He was first vice-president last term, and succeeds Fred Wigmore, Hughson & Merton Co. Other officers elected are: Charles G. Putnam, vice-president; Arthur J. Hitt, second vice-president; Traver Hubbard, corresponding secretary; Clay Estes, recording secretary and Bruno Kaufner, treasurer. The directors are: Fred Wigmore, chairman; Jack J. Jackson, Homer Q. Wilson, Fred C. Wood, D. J. Bartelme and Walter Stone.

4TH TEST OF A SERIES

proves

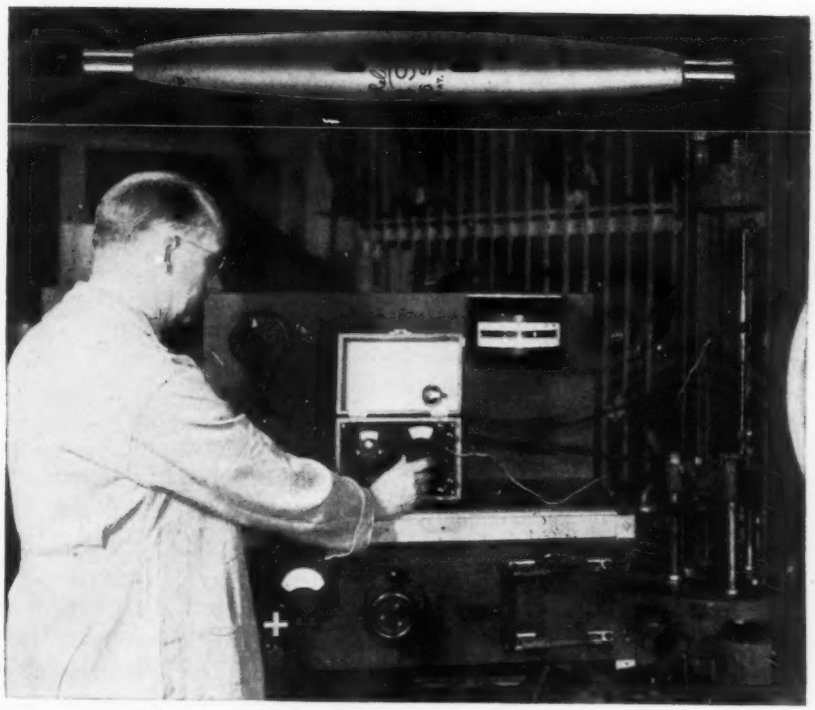
Reliable STRAIGHTLINE SPLICES AND DEAD ENDS

HIGH IN CONDUCTIVITY



Load tests, that range from summer span to full line strength, consistently show Reliable Connectors, Splices and Dead Ends to have better conductivity than an equal length of the line wire. Here again precise quality control establishes and maintains Reliable uniformity.

1. Gripping Test
2. Vibration Test
3. Corrosion Test
4. Conductivity Test



An actual test of conductivity under varying tensions being conducted on a Reliable STRAIGHTLINE SPLICE.

RELIABLE ELECTRIC COMPANY

3145 Carroll Avenue, Chicago 12, Ill.

OVER 35 YEARS' SERVICE TO THE UTILITIES

NEWS of the industry

FORMAL BID MADE FOR PUGET SOUND SYSTEM

Formal offer of $18 per share for its 2,177,879 shares of common stock was made to Puget Sound Power and Light Co. last month by Guy C. Myers, acting for a group of Washington PUDs. The offer is considered to be equivalent to approximately 112 million dollars for the company properties, including non-electric subsidiaries, which under the PUD offer, would be sold to "some person or persons" other than the districts.

The offer includes two plans, one for direct purchase of shares, the other for payment of $18 per share to common stockholders as a net liquidating dividend after sale of all the company's properties and assets. In no case would the stockholders receive more than $18 a share.

The proposal was to be laid before the company's board of directors and, for adoption, would require affirmative action of at least two thirds of the common stockholders. It does not become fully effective so far as the districts are concerned until 48 hours after the company gives notice that it will call a stockholders meeting.

Intention to build competing lines in the event the offer were refused was stated in a letter accompanying the proposal.

An offer of 90 million dollars made by Bonneville Administrator Paul J. Raver, acting for PUDs and the city of Seattle, was rejected recently by the Puget Sound board of directors. According to Frank McLaughlin, company president, the two offers can not be compared, because the Raver offer did not include the company's two major subsidiaries, the North Coast Transportation and the Diamond Ice and Cold Storage companies, gas plants at Bellingham and Wenatchee, nor a telephone plant on Vashon Island.

Approximately 30% of the company's gross revenue is derived from Seattle's metropolitan area, and McLaughlin pointed out that, if the public agencies should acquire the properties, they could save seven million dollars in annual operating costs, which the company has had to pay out in federal, state and municipal taxes and in bond interest and dividends.

David Levine, chairman of the city council finance committee, stated that the city had not been consulted in connection with the PUD offer and declared that the council was going to watch the deal closely since it has a tremendous interest in the outcome. The city would be interested only in those parts of the property that could be absorbed usefully by City Light and not in anything else the company may own and the PUDs buy, he stated. The company's Seattle franchise expires in 1952.

Twelve PUDs signed the offer and three additional districts adopted resolutions consenting to the purchase.

Idaho Commission Ups Co-op Tax Valuations

Property valuations of Idaho electric cooperatives were increased 57% in State Tax Commission assessments announced last month. Valuations for business managed electric companies showed small increases, with the total fixed at $33,730,954, as compared with $33,083,954 last year.

Valuations of REA districts were increased, according to Commission Chairman E. D. Baird, "to bring them more in line with other property in the state." Total valuation of the 12 co-ops was increased from $210,385, set in 1944 by a now defunct board of equalization, to $368,771.

Co-op representatives lodged a strong protest with the commission, stating that "if such an excessive rate is continued to be levied against these associations, they will be unable to reach other farm homes desiring electric service which the private utilities cannot and will not reach."

● ELECTRIC AND GAS utility property valuations in California account for $572,414,610 of public utility holdings valued at $1,072,916,430 for 1945, it was reported recently by the State Board of Equalization. Tangible property of power companies increased from $560,098,850 for last year. They are the largest classification of property taxpayers subject to state assessment.

● THREE 25,000-kw. turbo-generators for Keswick Dam in California's Central Valley project were authorized recently by OWU. Keswick, purely a power dam, was started in 1941 and halted late in 1942, after which a small amount of work was permitted to prevent deterioration. Power house structure is about complete and the units averaged about 35% complete when halted.

ARIZONA DIVERSION PLAN SENT TO SENATE GROUP

Eleven hydroelectric plants are contemplated in a $487,000,000 plan for diversion to central Arizona of the state's share of Colorado River waters. The plan was one of three presented to a subcommittee of the Senate Irrigation and Reclamation Committee and was considered the best of the three in the light of preliminary data available.

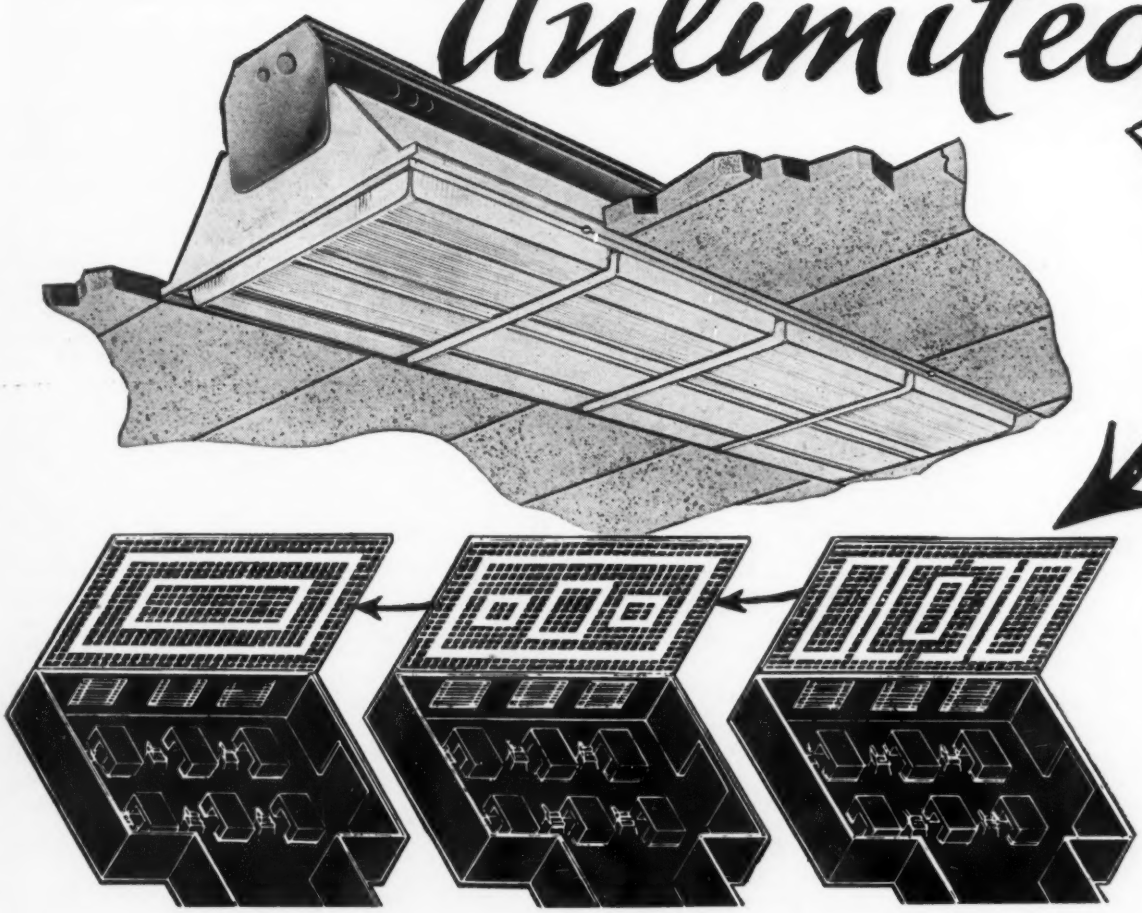
It entails a high dam for diversion at Marble Gorge, near the Utah-Arizona line, a 139-mile tunnel, of 3,000 c.f.s. capacity, to a point in the Verde River Valley whence water would be run through a series of power plants before reaching the irrigation areas around Phoenix. One power plant would be located at the diversion dam, the other ten between the tunnel's end and the irrigation site.

The committee reported itself "impressed with the potentialities of hydroelectric power developments resulting from the irrigation projects discussed during the hearings." It quoted testimony of H. F. McPhail, director of the Reclamation Bureau's power utilization branch, who said that if the Marble Gorge diversion plan is constructed, the proposed power plants on the Verde River would be connected by transmission lines into the primary system at Phoenix. If one of the other diversion plans is adopted, plants on the Verde River would be justified only on a much smaller scale, he stated, adding that "in view of the fact that possible production of energy will greatly exceed the ultimate estimated load of the state, development of markets for electric energy outside the state, as well as inside, should be encouraged and matured." In this way, the best interests of the state will be served without endangering or limiting the value to Arizona of its potential power possibilities, he pointed out.

● HEARING on proposed changes in Bonneville rate schedules, called by FPC on complaint of five Pacific Northwest power companies (EWEST, August, p 92) was cancelled late in August. The action followed advice from the companies that, inasmuch as testimony would be confined to modification of existing schedules, they would not submit evidence.

● AN ELECTRIC COOPERATIVE has been organized in Walla Walla, Wash. to purchase and distribute Bonneville power. The area is served by P[illegible]&L.

The Miller Fluorescent Troffer Lighting System gives you *Ceilings Unlimited*



Other Pluses of MILLER Fluorescent Troffer Lighting Systems:

Supports from structural ceiling reduced 50 to 75%. •

Conduit and conduit fitting costs reduced up to 80%. •

Wiring costs reduced up to 50%. •

Permanent operation and maintenance economies.

This lighting system is truly versatile. In fact, its practicable applications are almost unlimited. Note today's trend towards planning the *building* around the *lighting!*

In geometric patterns and lightstrips "by the mile," Miller Fluorescent Troffer Lighting Systems suggest new architectural themes. So do their glass and plastic lenses, plates, and metal or plastic grilles . . . all designed to meet specific architectural and lighting requirements.

And they're engineered to lick *structural* problems, too. One example of this is the patented Miller Bracket:

It does away with laborious fitting of recessed lighting systems in hung ceilings. One simply hangs the bracket from the *structural* ceiling—and both furred ceiling and Troffer Lighting System are hung *from the bracket!*

Miller field engineers are conveniently located. They will be glad to explain this and other Miller advantages—clearly and briefly.

THE MILLER COMPANY • MERIDEN, CONNECTICUT

ILLUMINATING DIVISION
Fluorescent, Incandescent Mercury Lighting Equipment

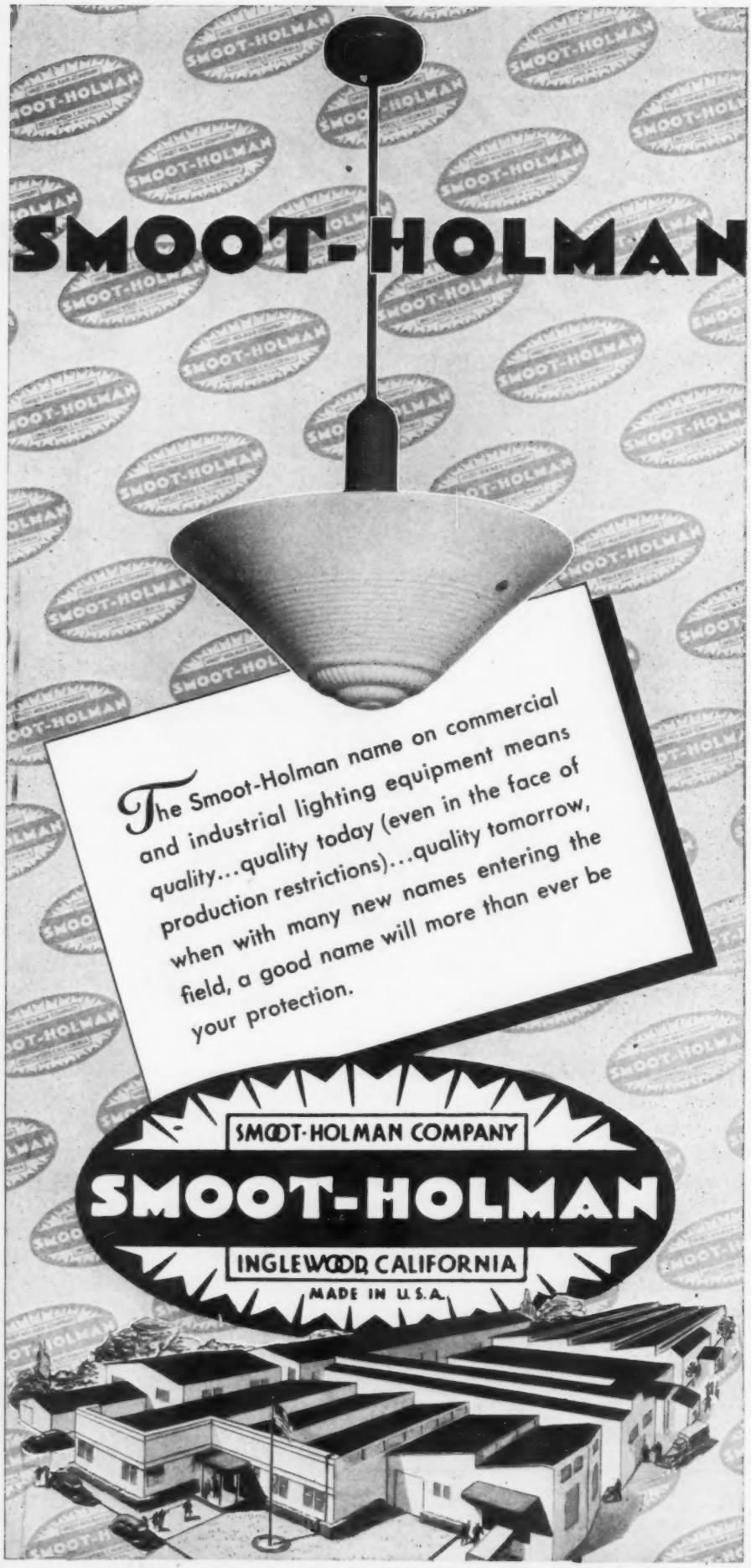
OIL GOODS DIVISION
Domestic Oil Burners and Liquid Fuel Devices

ROLLING MILL DIVISION
Phosphor Bronze and Brass in Sheets, Strips and Rolls

WAR CONTRACTS DIVISION
War Materiel

FOUNDRY DIVISION
Non-Ferrous Metal Castings

MILLER SINCE 1844


SMOOT-HOLMAN
The Smoot-Holman name on commercial and industrial lighting equipment means quality...quality today (even in the face of production restrictions)...quality tomorrow, when with many new names entering the field, a good name will more than ever be your protection.
SMOOT-HOLMAN COMPANY
SMOOT-HOLMAN
INGLEWOOD, CALIFORNIA
MADE IN U.S.A.
Offices in Principal Western Cities—Branch and Warehouse in San Francisco

COURT ACTION ASKED IN RATE SCHEDULE DISPUTE

Payment by Puget Sound Power & Light Co. of $272,739, representing the difference between the amount paid for Bonneville power since the first of November and that claimed due under a change in rate schedule, was asked in a suit brought by BPA Aug. 10 in U. S. District Court at Seattle.

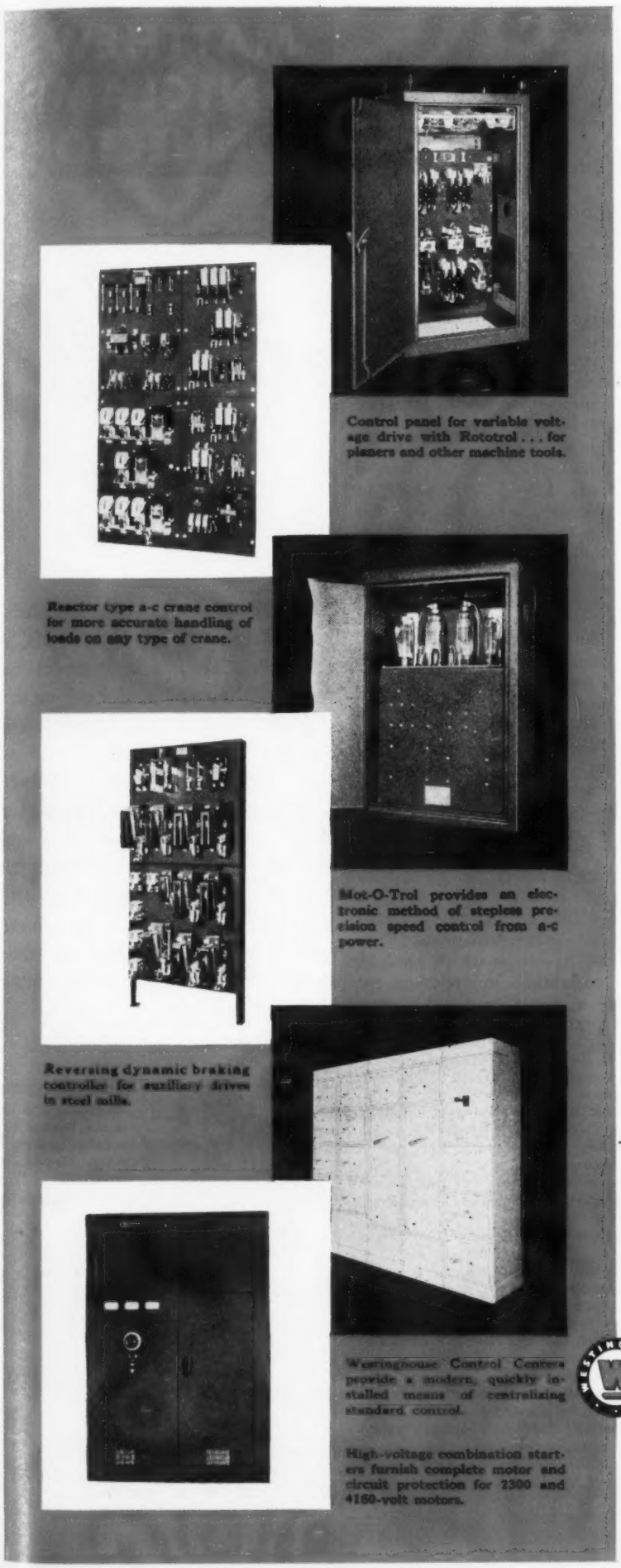
At issue is whether the company is entitled to receive power at $17.50 per kilowatt year under the C3 power schedule, or should go on the F2 schedule, which would increase its power cost between $30,000 and $40,000 a month. The former rate was charged under a contract signed in November 1943 and expiring last year.

In its complaint, Bonneville asks that the company be forced to pay a total of $1,296,925 instead of the $1,028,563 paid since the expiration of the contract. The amount includes power cost under schedule F2, plus penalties and interest.

Dubbing the action "discriminatory" and designed purely and simply to force the company to "wheel" power to Clallam County PUD, Frank McLaughlin, Puget Sound president, stated: "We most certainly will fight it. . . . They previously delivered power to us at $17.50 per kilowatt year and the basic conditions have not changed in any way. As we see it, we were a firm power customer then and we are still a firm power customer. For that reason we have refused to purchase power from Bonneville at other than the $17.50 rate and we will continue to do so."

● By Changing zone classifications Pacific Gas and Electric Co. has reduced electric rates for nine California communities. The company requested the State Railroad Commission to change the unincorporated townships concerned from rural to zone five classification. Consumers in the suburban areas around Carmel, Salinas, Seaside, Napa, Arvin, Lamont, East San Jose, Redwood City and Stockton will benefit by a total savings of $49,000 a year. New rates became effective Sept. 1.

● Proposal that transformer equipment in the Riverbank Aluminum plant be used by Modesto and Turlock Irrigation Districts for handling Hetch Hetchy power was declared impractical by L. M. Perrin, San Francisco Utilities Commission engineer. Perrin advocated purchase of new substation equipment. The Riverbank installation was designed for larger voltages and heavier load than the districts will have, he said.



Control panel for variable voltage drive with Rototrol . . . for planers and other machine tools.

Reactor type a-c crane control for more accurate handling of loads on any type of crane.

Mot-O-Trol provides an electronic method of stepless precision speed control from a-c power.

Reversing dynamic braking controller for auxiliary drives in steel mills.

Westinghouse Control Centers provide a modern, quickly installed means of centralizing standard control.

High-voltage combination starters furnish complete motor and circuit protection for 2300 and 4160-volt motors.

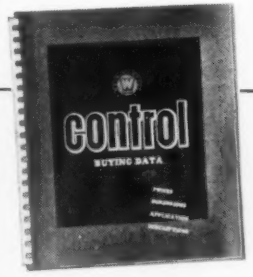
For any Motor Control

. . . call Westinghouse

Control properly selected and applied makes it easy to put motors through their paces . . . to stand up and deliver. Application of control can be greatly simplified also by making one supplier responsible for the entire motor drive.

Westinghouse motor control not only covers the entire range of standard a-c and d-c controls and accessories for every type of drive, but many specialized types of control like those shown at left. Regardless of the job, you are assured of a completely co-ordinated installation. Call your Westinghouse office, or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa.

J-60587



Selection of Westinghouse standard motor control is greatly simplified by this 290-page Buying Data book. If you do not have a copy, phone or write your Westinghouse office for Catalog 7000.

Westinghouse

PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE

Motor Control

Surplus Security for YOUR LAMPS

McGILL
LAMP GUARDS . . . .
designed for Double Duty

Thousands of industrial, commercial and home users are finding the McGill Lamp Guards provide their lamps with surplus security—by performing the double duties of light and safety protection.

Made of heavily tinned steel wire, McGill Loxon (Locking) Lamp Guards and Gripon Non Locking Guards afford excellent protection against breakage, fires and theft. Gripon Guards are attached with plain steel screws. Both are supplied in sizes to fit all sockets and for regular and mill type lamps.

Protector "O" Guards are designed for heavy duty use in general construction work. Tough and durable, they are hard to crush or break and may be easily moved from job to job.

Ask for Catalog No. 43. Lists complete facts about these and other McGill electrical specialties.

McGILL
MANUFACTURING CO., Inc.
Electrical Division
VALPARAISO, INDIANA

RAVER URGES PLAN FOR ALUMINUM PLANT DISPOSAL

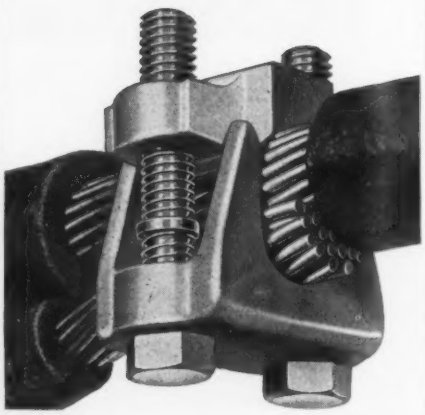
Immediate action to dispose of government-owned aluminum plants in such a way that new operators will be able to compete in peacetime world markets was asked by Bonneville Power Administrator Paul J. Raver recently in testimony before the Senate Mead committee, which is studying problems of disposal and peacetime operation of these plants. Development of a completely integrated aluminum industry in the Pacific Northwest, based on the region's existing reduction capacity, would provide employment for 25,000 workers, or almost four times as many as at present, he said.

Answering statements that Pacific Northwest aluminum plants would need a substantially lower power rate in order to compete successfully with the Shipshaw plant in Canada, Raver pointed out that the Bonneville-Grand Coulee power rate of $17.50 per kilowatt year is the lowest in the nation and is based on pay-out requirements. "If the competitive position of the Pacific Northwest aluminum reduction plants needs improvement as, for example, to combat the Shipshaw situation which is a result of past government financing policy, or because of adverse freight rates, some means must be found to assist or subsidize the light metals industry in the Northwest," he stated. "It is not possible under existing law for Bonneville to provide the subsidy through power rates. Nevertheless, we are ready to sit down with any company and work out a new rate within our pay-out requirements."

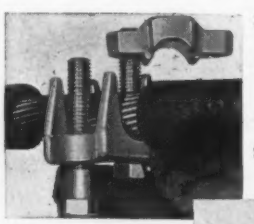
He outlined five steps which he said should be undertaken immediately by government agencies to assist new operators to take over the plants.

1. In order to prevent immediate shutdown of the major part of the aluminum capacity because of a shortage of war orders, minimum markets above immediate normal needs should be provided by government stockpiling of aluminum ingot as a national defense measure.
2. The government should control all surpluses of virgin and so-called secondary metal, releasing them gradually so as not to interfere with an orderly change of price levels.
3. Government should provide new operators with access to high-grade imported bauxite to insure an adequate and reliable source of raw material.
4. Government agencies should coordinate and increase efforts in the direction of assisting private enterprise to appraise both export and domestic use of light metals.
5. In order to help overcome problems of improper location, fractional capacity operation, and reopening of shut down plants, the government should provide engineering assistance in appraising production costs, grant flexible terms of lease, and assume the costs of plant alterations and, where necessary, finance relocation of improperly located plants or their equipment.

MATTHEWS UNICLAMP CONNECTORS

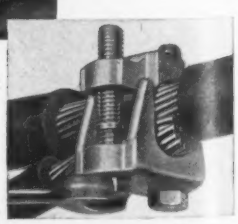


Made for use on copper or aluminum wires from 2/0 to 1000 MCM inclusive. They will connect two wires of their rated size or one wire of their rated size with one or more smaller tap-off wires down to No. 8 solid. They have many advantages over the larger sizes of connectors of the split bolt and other designs as they provide greater pressure between wires, hence greater holding power, are less costly, are easier to install and the assembled design is such that parts cannot become separated.



Fit on conductor as shown. Position top member and partially thread in free bolt.

Insert tap wire and equally draw up both bolts.



Write for Bulletin 206

W. N. MATTHEWS CORP.
3722 FOREST PARK BLVD.
ST. LOUIS 8, MO.

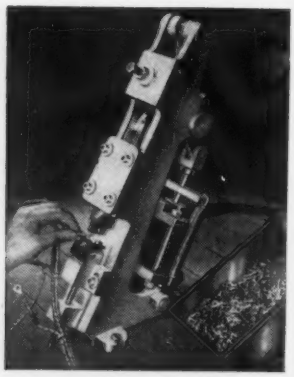
"OKAY... BUT IT'S GONNA LOOK LIKE A BOAT"

• *Remember the old vaudeville gag about the drunk who insisted that a specialist in marine paintings do his portrait? After much arguing the artist finally agreed to paint the portrait. "But," he said, "I warn you: It's going to look like a boat!"*

That situation fits us perfectly today. We have started our reconversion—a good start. But as this was written, most of our facilities were still devoted to ending the war. But we have kept on trying and, honestly, the rockets *are* now looking more and more like lamps. And, before long we will be able to tell you we're again making these fine Railley lamps in quantity. Be patient just a little longer, won't you?

Railley
CORPORATION · CLEVELAND, OHIO
ORIGINATORS OF THE
PIN-IT-UP LAMP

Now Making for Victory: X-RAY PARTS • GAS PROOF COVERS
ROCKET PROPULSION UNITS • DUMMY FUZES • PRACTICE CARTRIDGES



FOR HIGH SPEED PRODUCTION *of* HARNESS ASSEMBLIES

Install genuine T&B Sta-Kon* Pressure (solderless) Terminals for wire sizes #22 through 250 MCM with T&B Power Bench Tools. Some models are engineered to make up to 8000 perfect and Approved Sta-Kon Terminal installations a day. In fact the Sta-Kon Way has been called the speed way of assembly line production by manufacturers who have changed over from solder. Sta-Kon Tools are designed for whichever power you prefer: air, hydraulic or electric.

Write us for Bulletin S-500 for complete information, blue prints and engineering data.

Note L-O-N-G Stake-mark, sign of a perfect installation

Sold only through T&B Electrical Wholesalers

The Thomas & Betts Co., Incorporated
103 N. Santa Fe Avenue
Los Angeles 12, Calif.

The Thomas & Betts Co., Incorporated
542 Natoma Street
San Francisco, California

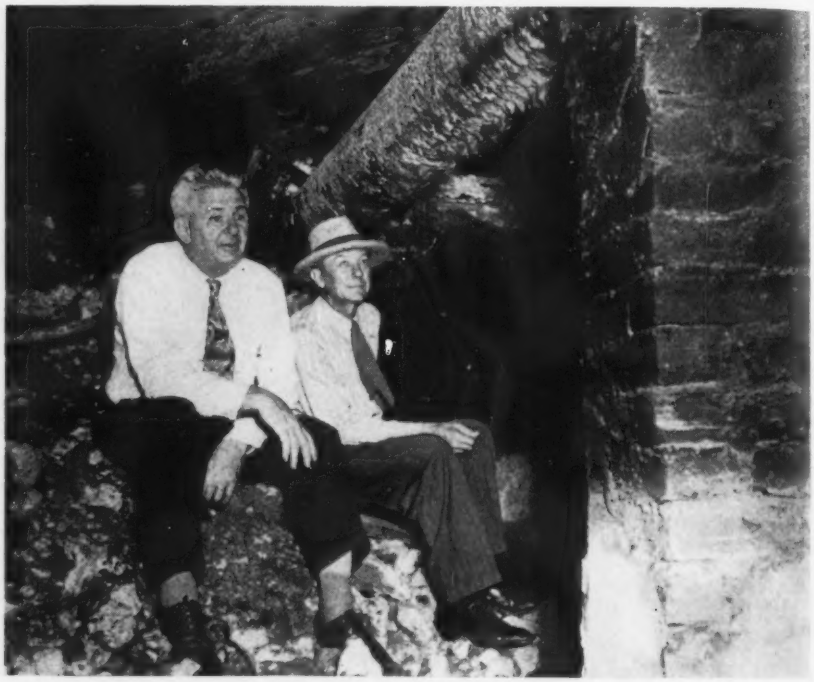
Paul Douden & Co.
1645 Wazee Street
Denver 2, Colorado

F. A. Strohecker
301 Eyres Bldg.
2207 First Ave., S.
Seattle 4, Washington

*Trademark: Reg. U. S. Pat. Off.

T&B

THE THOMAS & BETTS CO.
INCORPORATED
manufacturers of electrical fittings since 1898
ELIZABETH, 1, NEW JERSEY
In Canada: Thomas & Betts Ltd., Montreal



During recent construction of a new section of underground system, Hawaiian Electric Co. workmen uncovered an ancient cistern, which had remained undetected beneath one of Honolulu's heavily traveled streets. The pit, about 14 x 18 ft. and roughly 18 ft. deep, is believed to be more than 100 years old. Only three-foot roadbed lay between its roof and street above and city officials wonder why the road did not cave in long ago. In picture are Joseph F. Kunesh, city-county engineer, and George Hess, Hawaiian Electric contractor. Photo is by the Honolulu Advertiser

Utility Improvements Planned in Colorado

The war's end was followed by hopeful announcements in Denver, of extensive enlargements and improvements to be made by the three large electric utility companies headquartered there:

Public Service Co. of Colorado, reported president John E. Loiseau, is embarking on a twelve-million-dollar expansion and rehabilitation program, to be completed over a period of five years as materials and manpower become available. Looming big and demanding early attention is the problem of supplying equipment and service for customers who desire gas heat.

The Denver Tramway Corp., whose changeover from streetcars to trolley buses was well advanced when war intervened, will shortly resume the conversion with delivery of five coaches this fall. Most of the necessary wire for this operation is already on hand.

Mountain States Telephone and Telegraph Co.'s primary objective will be restoration to prewar standards of long distance facilities; second in importance will be to fill the demand for 60,624 new telephone installations.

● E. B. DEBLER, director of Region 7, USBR, has announced a 15% electric rate reduction in Grand Lake, Colo. It is retroactive to July 1, 1945 and is proportionate to savings effected by the local company since it began purchasing energy from the bureau's 21,600-kw. generating station at Green Mountain Dam, he said.

● A 70-MILE TRANSMISSION line from Las Cruces to Alamogordo, N. M. is being constructed by the USBR to transmit power from Elephant Butte Dam and will be completed about Oct. 1. The line will serve the Army ordnance proving grounds at White Sands, the city of Alamogordo and an air field. Eventually it also will serve REA cooperatives in New Mexico, according to Wesley R. Nelson, USBR regional director.

● COMPETITIVE bidding will continue to be USBR policy in awarding construction contracts for irrigation and power projects, Commissioner Harry W. Bashore has announced. If special or unique conditions of work or other factors exist, the bureau may elect to do the job by force-account, he said, but this will be the exception to the rule. On the day and time set for opening of bids, name of each bidder and the amount of bid will be made public.

HERE'S ONLY A FEW OF THE IMPORTANT REASONS WHY THESE THREE PREFER G.E.

1. *Users* in stores, offices and factories prefer Watch Dogs because they eliminate annoying blink once and for all. Once the Watch Dog starter cuts out, blinking cannot possibly recur.

Lighting Engineers specify Watch Dogs because their precise construction provides unusually long life. The Watch Dog outlasts five ordinary starters. **2.**

3. *Maintenance Men* consider Watch Dogs as faithful helpers because these starters reduce lighting maintenance to the simple job of pushing a button before relamping. Simply reset it . . . forget it.

G-E Watch Dog Starters have been providing efficient and economical service for 30-, 40-, and 100-watt lamps in commercial and industrial lighting fixtures for several years. These manual reset starters have saved many manhours of maintenance. They've completely eliminated annoying blink of dying lamps. They have extended the life of fluorescent lamps with precision starting and positive stopping. Users of fluorescent lighting, engineers and maintenance men all over the nation are switching to G-E Watch Dog Starters, the preferred safeguards for fluorescent lighting.

Get the complete story about G-E Watch Dogs by writing to Section G956-18, Appliance and Merchandise Dept., General Electric Co., Bridgeport, Conn.

BUY WAR BONDS AND KEEP THEM

GENERAL ELECTRIC

Sherman LUGS

Standard Sherman Lug with Closed Round End

Standard 2-Hole Lug

Heavy Duty 4-Hole Lug

For Dependable Soldered Connections

You get a perfect solder joint every time when you use Sherman Lugs, because we take a lot of pains to see that Sherman Lugs are clean, bright, and free from grease — inside as well as outside.

To prepare them for good soldering, Sherman Lugs, after they are made, are first tumbled in sawdust. Then they go through a special acid cleaning bath (bright finish) which removes all traces of corrosion, dirt, grease or other foreign matter. After that, they are rigidly inspected to make sure that every individual lug is perfect.

Sherman also has complete facilities for hot tinning and electro-tinning.

Specify Sherman Lugs on your next order. You'll find that it pays!

H. B. Sherman Mfg. Company
Battle Creek, Michigan

Write for Sherman Catalog!

Also:

Solderless Lugs

Splicing Sleeves

Split Bolt Connectors

Wedge Grip Connectors

Ground Clamps and Fittings

Armor Rod Clamps

Jumper Clamps

P G and E ASKS TO BUY PRIVATE POWER PLANTS

Pacific Gas and Electric Co. has requested California Railroad Commission approval of a plan to purchase parts of the Red River Lumber Co.'s generating system. Purchase price is approximately $2,524,000.

This is the final phase of the lumber company's attempt to liquidate its properties. Last December it sold all its timber holdings, its sawmill and the entire town of Westwood, Lassen County. Purchaser in the $10,000,000 deal, which included the Westwood electric distribution system, was the Fruit Growers Supply Co. At the same time Northern Counties Utility Co. bought part of Red River's extensive electrical distribution system.

If the commission approves the PG and E request, the utility will take over the Hat Creek power plants No. 1 and 2, Hat Creek transmission and telephone lines, the Hamilton branch hydroelectric plant on the Feather River in Plumas County and the Mountain Meadow reservoir, with a storage capacity of 24,000 acre-ft. Effective date of the purchase would be Sept. 15.

Imperial District Plans Power System Improvements

Studies of possible extensions to its power system and means of financing such improvements have been authorized by the Imperial Irrigation District. A preliminary report to the board of directors declared that the district's dependable capacity of 21,375 kwh. is less than peak load under present conditions.

Under study are a proposed steam generating plant to supplement hydroelectric power from the All American canal and additional generating units at Drops 3 and 4 on the canal.

Two separate engineering reports will be prepared by M. J. Dowd, district consulting engineer, and Lester S. Ready. The engineers were asked to estimate whether gross revenues of the enlarged district power system will pay both principal and interest on all existing and proposed power revenue bonds, after reasonable deductions for operation and maintenance.

● PERMISSION to build a 45-mile transmission line connecting the California Electric Power Co.'s oil-electric generating plant at Twenty-Nine Palms with Garnet in southern California has been asked by the utility in an application to the California Railroad Commission. To cost about $120,000, the extension would provide service to 80% of potential consumers in the area.

ALL KINDS of SMALL TRANSFORMERS

—in the JEFFRIES line

Practically all your small transformer needs are supplied by the Complete Jeffries line. We have specialized for years in providing transformers to exactly match your requirements. If not in our regular line, we build to meet your specifications—in a hurry!!

Minimize your voltage losses. Specify scattered transformers to eliminate duplicate conduit runs, and save on power costs.

JEFFRIES TRANSFORMER COMPANY
1710 E. 57th St. Los Angeles 11, Calif.

Real Estate Loans

F. H. A. loans are readily available on existing homes up to 80% of the appraised value. You can buy a home and pay for it in small monthly installments like rent. For example, a 20-year loan of $4000 would cost about $33.71 per month, including taxes, insurance, principal and interest.

Come in and talk with us. We can help you get the home you want.

CROCKER FIRST NATIONAL BANK
OF SAN FRANCISCO
California's Oldest National Bank
ONE MONTGOMERY STREET
Member Federal Deposit Insurance Corporation

NEW MEXICO CO-OP BUYS POWER COMPANY PLANT

Purchase of an electric plant by one New Mexico REA cooperative has been approved by the New Mexico Public Service Commission, and another cooperative has announced plans to start work on line construction by Nov. 1.

The Socorro Electric Cooperative Inc., with SEC approval, has bought the Socorro properties of the New Mexico Public Service Co. and expects to take over operation of the plant in October, according to P. J. Burt, manager. It will serve customers in the town over the present distribution system and later will supply electricity to adjoining rural areas over proposed lines, first of which will serve between 250 and 300 customers on a 150-mile route.

The Springer Cooperative in the northeastern section of the state will begin construction of lines to serve 330 of 536 signed customers by Nov. 1, according to Olen Caviness, who reported that the association was negotiating with several power companies for a contract to purchase power.

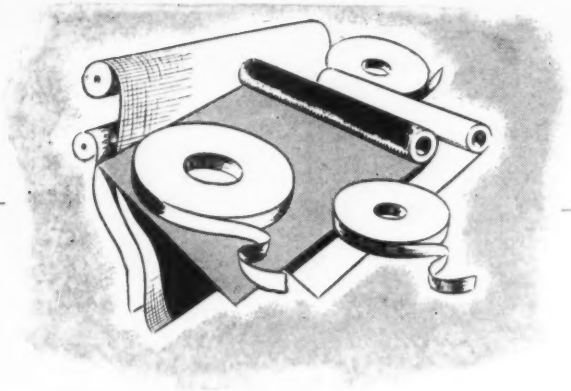
Co-op Begins Survey to Route Electric Lines

A survey to determine best routes for its lines has been started by the Central New Mexico Electric Cooperative, recently incorporated to serve rural residents in an area of several hundred square miles in central New Mexico.

Tentative plans call for from 150 to 250 miles of line to serve territory near Vaughn, Encino, Cedarvale, Corona and possibly other towns. Proposals have been made to purchase and operate electrical distribution systems in the towns themselves and existing power plants at Vaughn and Encino. Final arrangements await completion of the survey about the middle of September.

The co-op has signed about 250 customers, it is reported. Benjamin Roberts, Corona, is president and A. E. Huntsinger, Vaughn, is treasurer.

● B. C. ELECTRIC's ten-million-dollar bond issue was oversubscribed in approximately 25 minutes, it was announced recently by President W. G. Murrin. The money will be added to working capital to carry out the first phase of the company's fifty-million-dollar postwar program. Development of Bridge River hydroelectric resources and construction of a new substation in Vancouver will be the first projects to be started.



NOW AVAILABLE...

Silicone Fiberglas Cloth...

A High-Temperature Insulation Material

The combination of silicone resin and Fiberglas* provides the manufacturer or repair company with an excellent insulation material designed for use where high ambient, and high operating temperatures are encountered. This insulation more nearly approaches the temperature range of inorganic insulation material. Furthermore, this material has the ability to withstand the heat generated inside of windings and to dissipate the excess temperatures of "hot spots."

SAVES MATERIAL

Equipment can be made smaller because it is possible to use a thinner Fiberglas textile than ordinary textile to provide the same insulation. Smaller equipment that maintains the same ratings means less weight and lower cost in material. When used for portable tools, etc., it means less operator fatigue.

LARGE SELECTION AVAILABLE

This material is available in thicknesses of 4, 7, 10, and 12 mils. It can be purchased in rolls 36" wide or tapes cut to specified widths in 36-yard rolls.

You can order directly from Mica Insulator Company's conveniently located sales offices.

UNBIASED RECOMMENDATIONS

Because Mica Insulator Company carries a complete line of all types of insulating materials, you can obtain unbiased recommendations that help solve insulation problems.

**Reg. Trademark Owens-Corning Fiberglas Corp.*

Mica Insulator Company

200 VARICK STREET • NEW YORK 14, N. Y.

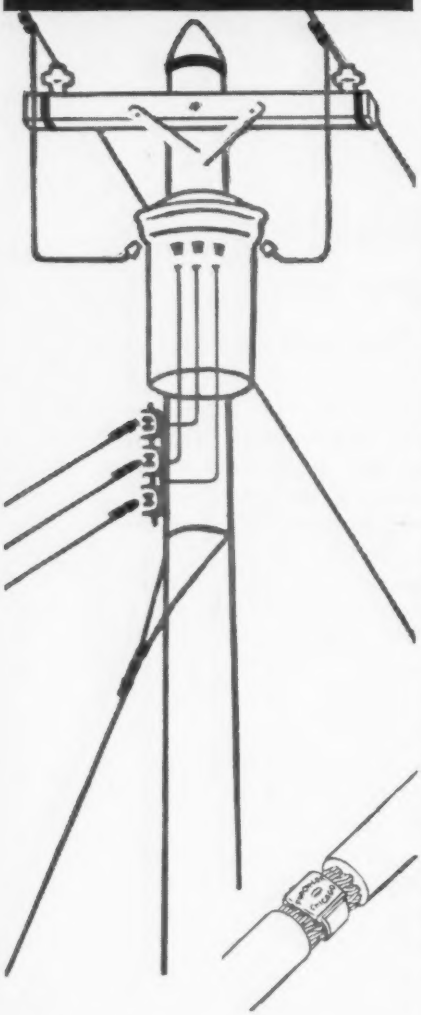
SALES OFFICES:

Chicago: 600 West Van Buren Street • Cleveland: 1276 West 3rd Street
Detroit: Book Building • Cincinnati: 3403 Hazelwood Avenue • Boston: 285 Columbus Avenue • Houston: Bakoring, Inc., 1020 Houston Avenue

WEST COAST DISTRIBUTOR:

The Triangle-Pacific Company at—Los Angeles: 340 Azusa Street
San Francisco: 1045 Bryant Street • Seattle: 95 Connecticut Street

PUNCH-LOK
Streamlined
Banding and Splicing Method



With Punch-Lok Clamps, applied with the Loking Tool, you can make connections easily, quickly, simply, safely . . . without taking down wires or installations. Will withstand any normal pull strain. Many other applications for repairing, banding, splicing, tying.

For descriptive catalog and name of nearest distributor, write Harry M. Thomas, Pacific Coast Representative, Dept. O, 1554 Oakland Avenue, Piedmont 11, California.

Keep Buying War Bonds

PUNCH-LOK COMPANY
321 N. Justine Street
Chicago 7, Illinois

ARMY ENGINEERS PROPOSE SNAKE RIVER DEVELOPMENT

A $124,000,000 development program for the Snake River in southeastern Washington and Idaho proposed by the Army Engineers calls for four high dams, including power facilities and navigation locks. Cost of the power facilities would be $29,000,000 and 1,320,000 kwh. would be generated.

This proposal replaces earlier plans for ten low navigation dams, according to Herbert G. West, executive vice-president of the Inland Empire Waterways Assn., who appeared at a hearing before the subcommittee of the House Rivers and Harbors Committee in Lewiston, Idaho.

FM Station Installation Scheduled by Utility

Intercommunication between the Lakeview and Klamath Falls, Ore., plants of the California Oregon Power Co. will be provided by a 250-watt FM radio transmitter station which the utility plans to construct in Lakeview, it was announced recently. Communication with repair crews will be provided by walkie-talkie sets.

Company plans also call for construction of a new power line between Lakeview and Alturas, Calif. This will be the first step toward a loop line between the two towns, which will permit cut-in service for either area in the event of power failure in the other.

Copco Denied More Time to Study Proposed Power Plant

FPC has denied a California Oregon Power Co. request for a preliminary permit to continue studies of the proposed 40,000-kw. Toketee hydroelectric project on the North Umpqua River in Oregon.

In denying the request, the commission said that the company had been engaged in the study and planning of the project "for at least 22 years." Preliminary permit was granted on Aug. 15, 1927, following applications filed in 1923 and 1925. The commission order states that the company has not made a showing of facts entitling it to additional time.

● A NATIONAL OPA citation for helping to maintain vital transportation during critical war months has been received by Seattle City Light. The award, first of its kind presented in the area, noted that "efficient operation of a transportation plan had saved thousands of gallons of gasoline and wear on tires." E. R. Hoffman, City Light superintendent, received the citation from Arthur J. Krauss, district OPA director. He stated that much credit was due to employee cooperation and to the organized transportation plan effected by Frank Pettit, chairman of the utility's transportation committee.

CVP Association Announces Work Done and Dissolves

Its work completed, the Central Valley Project Assn., formed in 1933 to promote construction of California's Central Valley Project, was disbanded late in August, according to Roland Curran, secretary-manager.

Approved by Congress in 1935, all major units of the CVP are now well on the road to completion with the removal of wartime obstacles.

MIDWEST MANUFACTURER'S AGENT
Located in Milwaukee and covering Wisconsin seeks one additional line. Engineering graduate with practical background. Financially able to act as jobber or distributor. Sales minded and aggressive. Write Box 200, Electrical West, 68 Post Street, San Francisco 4, California.

Universal 8-pc. Tool Set, $14.85.....10 pc. $19.85
Wrench Set, 6 pc. Box end, $7.85..Open end, $ 9.85
Combination Box and Open 8 Wrench Set....$14.95
Midget ¼" or ⅜" Socket Set in Case.....$19.85
Standard ½" 15 pc. Socket Set and Case....$29.85
Tractor ¾" 14 pc. Socket Set and Case.....$49.85
Immediate Shipment—Clip Ad—Mail Check Now
UNIVERSAL TOOL CO.
1527 Grand EW Kansas City, Mo.

TORK CLOCKS

THE POPULAR TIME SWITCH LINE KNOWN EVERYWHERE

There is a Tork Clock for every regular switching job; 60 minute, 4 hour or daily cycles.

Bulletins on request

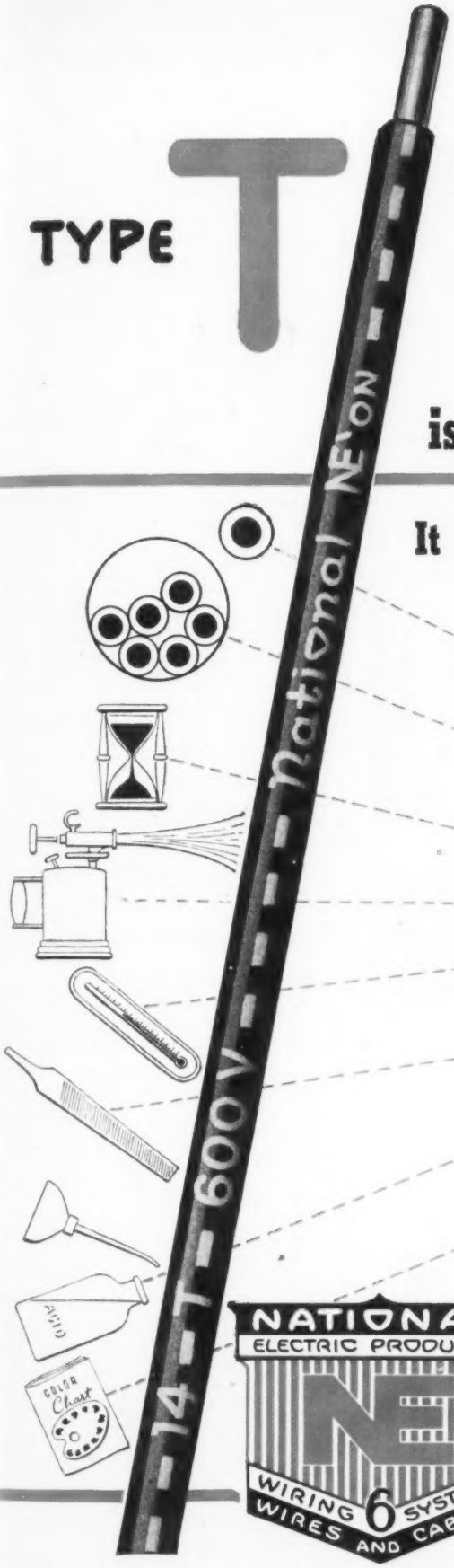
THE TORK CLOCK CO., Inc.
MOUNT VERNON, N. Y.

Western Representatives
A. R. Slimmon, 445 E. 3rd St....Los Angeles
Geo. H. Curtiss, 540 McAllister St.....S. F.
H. M. Sayers, 1101 Eastlake Ave.....Seattle
Stevens Sales Co., 41 P.O. Place, Salt Lake
Felix Simon, P.O. Box 614.....Denver
H. Geo. Shefler, P.O. Box 1587.....Phoenix

TYPE T NE`ON

(thermo-plastic)

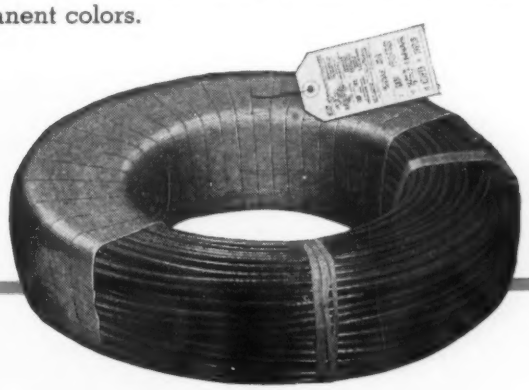
is a superior building wire (600 volts)



It offers these advantages over other types of electrical wiring:

- Superior dielectric properties, permitting minimum diameters.
- Greater number of Type T wires to the conduit, increasing wattage capacity as much as 212%.
- Better aging properties.
- Exceptional flame resistance.
- Approved for operating temperatures up to 60°C (140°F).
- Abrasion resistant—fibrous coverings unnecessary.
- High resistance to most acids and alkalies, alcohol, gasoline, oils and greases.
- Wide color range for easy identification. Permanent colors.

NATIONAL ELECTRIC PRODUCTS
WIRING 6 SYSTEMS
WIRES AND CABLES



Available in all standard sizes up to 2,000,000 CM. Sizes 14 to 4/0 are approved by Underwriters' Laboratories. And for unusually moist locations, specify National Electric Type TW. Engineering data on request.

National Electric
PRODUCTS CORPORATION
Pittsburgh 22, Pa.

RELAYS
FOR POSTWAR JOBS
That Ward Leonard Relays have so effectively served the needs of our Army, Navy and Air Corps, is a tribute to the design and quality of Ward Leonard routine production.
Designers of postwar products may rest assured that when they select relays from the Ward Leonard line, they have chosen relays of proven merit.
Send for bulletins describing light, intermediate and heavy-duty relays in various contact combinations.
BUY MORE WAR BONDS
WARD LEONARD
Electric control devices since 1892
Offices in all principal cities
WARD LEONARD ELECTRIC COMPANY, 68 SOUTH ST., MOUNT VERNON, N. Y.

CO-OP LINES REMOVED FROM PGE POLES, ENDING DISPUTE

Wires of Salem (Ore.) Electric, a cooperative supplying 150 customers with Bonneville power, have been removed from poles of the Portland General Electric Co., closing a controversy which for a time threatened to end in court action.

Following refusal of the Salem city council to grant a franchise to Salem Electric, PGE notified the cooperative that its wires must be removed from the poles by Aug. 13 or the company would remove them. A week's extension was granted, but on Aug. 20, after the co-op had failed to act, PGE removed the wires.

Salem Electric is operating on a limited scale in Salem's business district under a permit issued by the city council in 1940, which allows use of 20 poles. Twice this year, after the city council rejected the cooperative's petition for a franchise, the issue was submitted to voters and rejected.

The controversy hinged on provisions of a Salem city ordinance which requires all companies to use the same poles under prorated cost. Salem Electric maintained that this provision gave it the right to use PGE poles, even though operating without a franchise. Court action was considered to test this issue, but removal of the wires is believed to have ended the controversy.

Olds Promotes CVA Bill in Talk Before Power League

Upholding Senator Mitchell's CVA bill, Leland Olds, FPC chairman, last month told 200 members of the Public Power League of Washington that "the TVA idea is the only idea that can give realization to the objectives of all the people whether they be concerned with irrigation, power, navigation, states rights or free enterprise."

At the meeting in Everett, Wash., Olds asserted that, under CVA guidance an additional 7,000,000 acres could be put into production. Columbia basin streams are capable ultimately of sustaining 54,000,000 kw. of generating plants, equal to the entire installed capacity of the country today, he stated, adding that 10,000,000 kw. of this capacity can be installed within the next generation.

● An Employee Suggestion system for the small plant or store has been prepared by the Division of Small Business, Bureau of Foreign and Domestic Commerce and may be secured without charge from that bureau, Washington 25, D. C., or from any Commerce Department field office.

MONOPOLY CHARGED IN LOS ANGELES SUIT

Charging misuse of patent rights, an antitrust suit was filed in the U. S. District Court in Los Angeles in August to restrain an asserted monopoly in the distribution of electrical precipitation units.

The injunction suit was filed in the name of Attorney General Tom C. Clark and named as defendants the Western Precipitation Corp. of Los Angeles, the International Precipitation Co. of Los Angeles, the Research Corp. of New York and Walter A. Schmidt of Glendale, Calif., president of the two Los Angeles companies.

Named as co-conspirators were Howard A. Poillon, a retired president of the Los Angeles companies; Lodge-Cottrell Ltd., Birmingham, England; Siemans-Schuckert Werke, A.G., Berlin, Germany; Metallgesellschaft, A.G., Frankfurt, Germany; Siemens-Lurgi-Cottrell-Elektrofilter-Gesellschaft, M.B.H. fur Forschung und Patentverwertung, Berlin, Germany, and Precipitation Co. of Canada, Ltd.

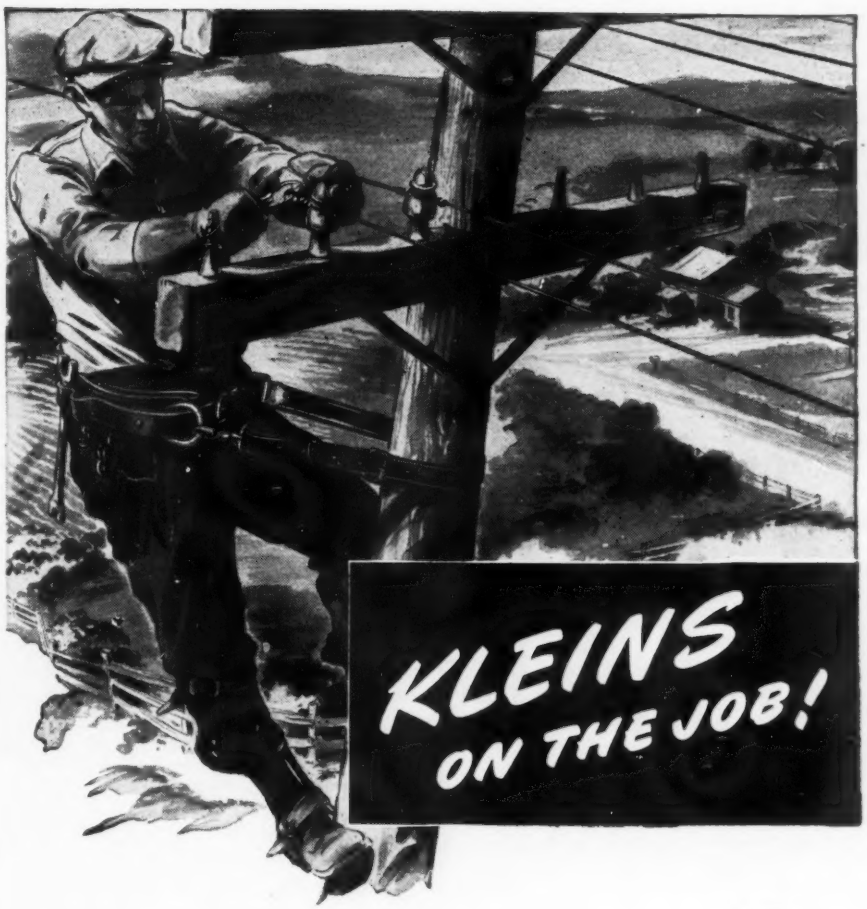
The suit charges violation of the Sherman Antitrust Law. It contends that the five foreign co-conspirator companies agreed to engage in no business in the United States and the American companies agreed to refrain from business outside the Western Hemisphere and U. S. possessions. The defendants also are accused of depriving other manufacturers of the right to use certain patents and information.

Subsidy Needed for Electric House Heating, Speaker Says

Opinion that electric house heating must be subsidized in order to make it economical enough for the average home owner was voiced in Seattle recently by Major S. E. Hutton, USBR engineer at Grand Coulee. Hutton was in Seattle to speak before the Junior Chamber of Commerce on the Columbia Basin project.

Answering a proposal that surplus blocks of power at Bonneville and Grand Coulee be used for house heating, he stated: "The cost of transformers and other equipment needed for house heating is so great that electric rates would be too high to make it practicable."

● DELIVERY of equipment, including a steel turbine and boiler, stimulated construction activities at the Albuquerque Gas and Electric Co., Albuquerque, N. M. A new steel and stucco building is being erected to house expanded plant facilities, President Arthur Prager announced.



● There's a mighty job to be done on the power and communication lines in America—improving present facilities—extending new lines to bring service to new users—both domestic and industrial.

Utility companies are laying plans now to start this program as soon as conditions permit. And included in their plans are new tools and equipment for the thousands of linemen and electricians required by this development. Klein pliers and Klein equipment will be on the job serving these men in the electrical industry as they have "Since 1857."

ASK YOUR SUPPLIER

Foreign Distributor: **International Standard Electric Corp., New York**

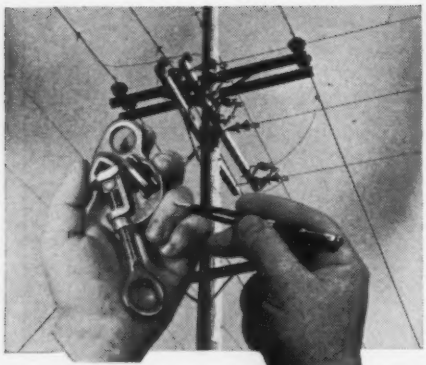
This book on the care and safe use of tools will be sent on request.

Since 1857

Mathias KLEIN & Sons

Established 1857 **Chicago, Ill., U.S.A.**

3200 BELMONT AVENUE, CHICAGO 18, ILLINOIS



TIPS
Perma-Grip
TAP CLAMPS
for permanent or temporary taps

Tips Perma-Grip Tap Clamps make economical, dependable hot tap connections that may be either permanent or temporary. Permanent because they stay put without vibrating loose—temporary because the eye screw is made to resist corrosion and may be readily unscrewed with a Clamp Stick when line changes are made. Perma-Grip Clamps are made for tapping to aluminum, copper or steel conductors. The range of sizes is complete to meet all requirements and every clamp has these distinctive features which years of development have proven most desirable and necessary.

THREE POINT CONTACT with conductor enables Tips Tap Clamps to handle the load without heating or burning and provides a tighter grip.

POSITIVE PRESSURE JUMPER CONNECTION makes a tight vibrationless contact that doesn't heat or burn.

CONTROLLED ELECTRICAL CONDUCTIVITY equals that of the maximum size jumper wire for each clamp—No excess weight—Sufficient conductivity in every size.

HIGH CORONA VALUE—minimum power loss—minimum corrosion.

FULL MACHINE CUT NC THREADS for quick, easy application, vibrationless grip and minimum danger of sticking. NF threads OPTIONAL.

HIGH MECHANICAL STRENGTH with average yield point of 165 in lbs. torque on eye screw and ultimate strength of 150 to 500 in. lbs. depending on size.

Deliveries are slow, therefore it is wise to order well in advance of the date clamps are needed. Consult your Tips Tool Catalog and order from your regular source of supply, specifying Tips Perma-Grip Clamps.

A·B·CHANCE CO. CENTRALIA MISSOURI

LOS ANGELES SETS UP ADVISORY SERVICE

Los Angeles Department of Water & Power has set up a program of advisory services to aid business during the reconversion period, it was announced by General Manager Samuel B. Morris.

A group of experts is ready to aid in redesigning commercial premises and to advise on wiring, lighting, heat treating and other electrical applications, he said. The same group during wartime compiled and maintained a complete list of machines available for Los Angeles industries, and contributed in other ways to solution of difficult wartime electrical and power production problems.

The department also will help in locating additional factory space and suitable sites for new plants. Many existing manufacturing concerns now are located in zones where manufacturing was approved for the duration only.

Utility Radio Program Receives Triple Honors

High-Lights of the Rockies, a radio program of the Public Service Co. of Colorado, broadcast weekly from the mile-high station of KLZ, Denver, has been accorded triple honors. The awards were jointly bestowed at a dinner arranged for J. E. Loiseau, president and general manager of the company, and members of his staff, according to Frank R. Jamison, chief of the organization's publicity and advertising department.

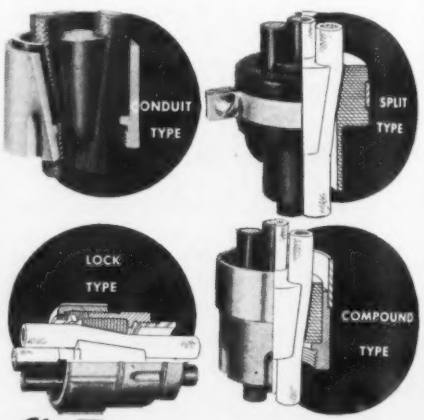
The City College of New York bestowed an award of merit "for the most effective institutional, commercial program developed by a radio station for the year 1944." *Variety* conferred a beautifully-engraved copper plaque to *High-Lights of the Rockies*, for "one of the most thoughtful and ambitious locally-produced radio programs of the year."

The third award came from within the shadows of KLZ's towers. For the second consecutive year, the Advertising Club of Denver picked the Public Service company's program for the "Ad of the Year" in the radio field.

High-Lights of the Rockies, while featuring other subjects, has largely devoted time to the history and romance of Colorado, Wyoming and adjacent territory, particularly episodes relating to early-day mining activities and adventures of the cattle and sheep-raising era. As each program in the series is broadcast, a transcription is made. Later, these disc records will be presented to the Colorado State Historical Society, as an authentic resume of pioneer days in the colorful state.

GEO. E. HONN CO.
420 Market St. San Francisco, Calif.
Sutter 7565
Manufacturers' Representative for:

American Cross-Arm, Inc.
Cross-Arms, Hardwood Pins and Moulding
Bartlett Mfg. Co.
Tree Trimming Equipment
Burndy Engineering Co.
Connectors and Lugs—All Types
Columbia Electric Mfg. Co.
Crompton Tong Test Ammeters
Cornell-Dubilier Electric Corp.
Capacitors for Power Factor Correction
T. J. Cope, Inc.
Underground Tools & Equipment
Herman D. Steel
Meter Jewels
Kellems Co.
Cable Grips for Pulling and Permanent Support
Minerallac Electric Co.
Insulating Compound, Clips, Hangers, and Statiscopes
Schweitzer & Conrad
Fuses and Protective Devices
Specialty Device
Cone Anchors, Guy Guards and Earth Augers
The States Company
Test Blocks and Meter Testing Equipment
R. Thomas & Sons Co.
Pin-type and Suspension Insulators
Electroline
Wire Rope Fittings



O.Z. CABLE SUPPORTS

CONDUIT TYPE CABLE SUPPORT for regular installations. Consists of a malleable iron body which is screwed on the conduit in place of the iron bushing and a wedging plug for gripping the cables.

SPLIT TYPE CABLE SUPPORT for use where cables are already installed. It consists of a two piece body held together by a steel band and the plug for gripping the cables.

O. Z. ELECTRICAL PRODUCTS
Conduit Fittings
Cable Terminators
Cast Iron Boxes
Solderless Connectors
Grounding Devices
Power Connectors

LOCK TYPE CABLE SUPPORT for supporting cables in a conduit in any position. A locking device secures the wedging plug to insure against loosening.

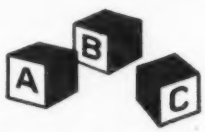
COMPOUND TYPE CABLE SUPPORT consists of a regular type support fitted with an extended collar to provide a compound chamber for sealing the end of the conduit

O.Z. ELECTRICAL MFG. CO.
262 BOND STREET · BROOKLYN, 2 N. Y.

Represented by
ASSOC. SALES ENGINEERS . 324 No. San Pedro St., Los Angeles 12, Cal.
THE FRANK H. BRAN CO. . . . 894 Folsom St., San Francisco 7, Cal.
LEONARD S. FOLEY . . 131 South West 4th Ave., Portland 4, Oregon
C. A. KING CO. . . . . 2323 Second Ave., Seattle, Wash.

TRUMBULL CONTROL CENTERS

Packaged Power Control



"BUILDING BLOCK" SIMPLICITY

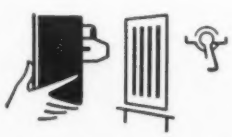
Trumbull Control Centers are not just an assembly of devices, they represent a basic wiring system wherein main bus bars and standardized control units are assembled in individual sections.

These standardized, enclosed units, composed not only of feeder circuit controls but also magnetic combination starters, Sizes 1, 2, 3, or 4, for control of power or lighting feeder circuits, are plugged into prefabricated, standardized vertical sections containing bus bars.

"FILE CABINET" EASE

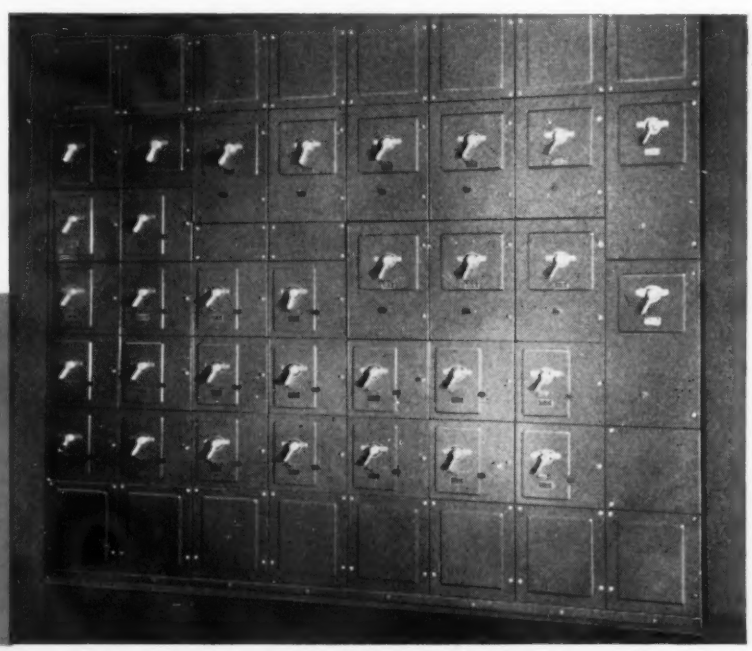
Vertical sections (13½" or 27"), into which control units are arranged as desired, provide extreme flexibility—sections may be added to, rearranged or removed to meet changing requirements. Sections or units of control centers may be shut down, or worked upon without interfering with adjacent units.

Contrast this method of installation with the usual practice of installing a "custom-built" switchboard mounted on skids and most frequently shipped as a single unit of large bulk and weight.



"PLUG-IN" ASSEMBLY

With vertical sections in place, control units used in the 13½" wide sections are quickly plugged in from the front after completion of construction work and wiring. Individual units may be removed, changed and inserted at will for inspection or maintenance purposes.



Typical Trumbull control center—with motor control combination units for 50 H. P. and less (Sizes 1, 2 and 3). "Start" and "Stop" push-button stations are located near the motors themselves throughout the plant with the controllers forming this compact control center—centrally located away from industrial congestion and unfavorable atmospheric conditions. *Entire line illustrated and described in Bulletin 411, sent on request.*

THE TRUMBULL ELECTRIC MANUFACTURING CO.

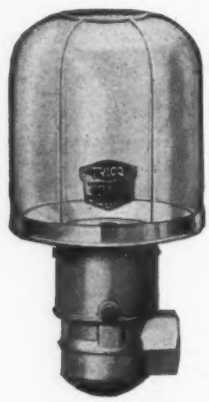
PLAINVILLE, CONNECTICUT

OTHER FACTORIES

NORWOOD (CINN.) OHIO — SEATTLE

SAN FRANCISCO — LOS ANGELES

DON'T GAMBLE with HAND OILING



OPTOMATIC Constant Level OILER

It's a "trust-to-luck" method—too much oil . . . or too little—IT'S ALL GUESSWORK!
INSTALL TRICO OILERS FOR . . . .

- Greater efficiency
- Increased output
- Longer bearing life
- Lower maintenance costs
- Saving of time, oil, worry
- Less fire and accident hazards

Modernize all equipment and you will always look with pride to every TRICO OILER installation you make. Hundreds of thousands are already in service giving definite economies in operation and maintenance. There's a style for every application. Write for catalog.

TRICO FUSE MFG. CO., Milwaukee 12, Wis.
Albert S. Knight, 3006 Western Ave., Seattle
W. E. Young Co.
1944 Broadway, Denver
H. H. Van Luven
307 E. 3rd St., Los Angeles

INSTALL TRICO REG. U.S. PAT. OFF. OILERS

How small strips of *NICHROME protect equipment worth millions

From simple home refrigerators to giant industrial equipment Electric Thermal Relays protect machines worth millions against damaging overloads. In these applications the heating action of special resistance units trips switches—cuts off power supplies at predetermined danger points.

To meet these requirements, Nichrome, made only by Driver-Harris, is used, for this is the alloy that possesses high thermal retentivity combined with excellent heat and corrosion resistance.

This 90 ampere, 600 volt Push-Button-Reset type Thermal Overload Relay employing Nichrome guards large Rolling Mill equipment in a steel plant. Right "Heater" has been removed to expose the thermal tripping mechanism.

If such dependable protection interests you, investigate Nichrome. Write for further facts today.

*Trade Mark Reg. U. S. Pat. Off.

Driver-Harris COMPANY

Stocked for the Coast Trade at ANGUS-CAMPBELL, INC.
235-241 San Bruno Ave., San Francisco • 449 So. San Pedro St., Los Angeles • 2122-4th Ave., Seattle
Main Office and Plant: HARRISON, NEW JERSEY

PEOPLE made this news

Puget Power Advances Four in Organization

Promotions in the Puget Sound Power & Light Co. organization were announced recently by President Frank McLaughlin. A. L. Pollard was made general superintendent of operations; R. W. Joyce, general commercial manager; A. S. J. Steele, manager of the Northeastern division, Everett; Harry Batchelder, central division sales manager, Seattle.

Pollard has been with the company for 15 years and was general superintendent at the time of his promotion. In his new post, he will supervise and coordinate activities of the division of power supply and the company's six geographical operating divisions in connection with construction, operation and maintenance of electric, gas, steam heat and telephone facilities.

Joyce joined the company in 1928 as a graduate engineering student and, upon completion of his training, was assigned to the treasurer's office in Seattle. He later held managerial positions in various parts of the company's system and for the past four years had been Northeastern division manager. He will have headquarters in Seattle and will be responsible for carrying out policies and programs affecting rates, contracts, rural electrification and related matters.

Steele is a graduate of the University of Texas in electrical engineering and joined Puget Power in 1930 at Bremerton, as manager of the Western district. Since 1934 he has been suburban manager, central division, Seattle.

Batchelder succeeds the late Ray Muffley. He was first employed by Coast Utilities, a subsidiary of the company and was transferred to the Puget Power sales department at Wenatchee in 1923. He was moved to Seattle and in 1929 became a sales supervisor. He was made assistant sales manager in 1932 and industrial service director in 1944.

● Edward J. Rising has been named manager of the appliance and radio division of the California Electric Supply Co. of San Francisco, manufacturer's representative in northern California. Rising at one time operated his own appliance business in Los Angeles and later was a manufacturer's representative in San Francisco. Recently he has been with Marinship.

Billica Returns to Coast as Copperweld Manager

Harry J. Billica has returned to the West Coast as Pacific district manager for Copperweld Steel Co. His headquarters are in San Francisco at the company's offices in the Rialto Bldg.

Billica was with Washington Water Power Co. for 14 years and later was Pacific district manager for the line material department of Graybar. He went to Washington Water Power from Ontario Power Co. at Niagara Falls, and while with the Spokane company served in various capacities, including those of operating and construction engineer.

From 1934 to 1940 he was with Indiana Steel & Wire Co. as sales engineer and just before Pearl Harbor he went to Washington, D. C., as senior priority advisor in the Power division and Office of War Utilities, WPB. He resigned in 1943 to join Copperweld.

Company Directors Name Williams vice-president

L. A. Williams, executive assistant to the president of Puget Sound Power & Light Co., has been elected a company vice-president by the board of directors. Williams started with the organization as sales promotion manger and advertising director. He moved from that post to district manager at Everett, then was transferred back to Seattle as assistant to the president.

● HARRY S. JENKINS, city electrician at Bellingham, Wash. since April 1920, has become an inspector for Sunset Insurance Co., working out of Bellingham. While city electrical inspector, he also was coordinator of Civilian Defense and represented the Underwriters' Laboratories in the area. His successor is DeWitt D. Hunhaver. He is a past president of the Northwestern Section, IAEI.

● E. E. BRAZIER, district manager, General Electric Supply Corp., Salt Lake City, corrects an error in reporting last issue. C. J. Vacher, former commercial lighting specialist of Utah Power & Light at Ogden has joined his organization, not General Electric Co. He becomes lamp and lighting specialist. Brazier also announces appointment of two territory salesmen, D. R. Smock and R. D. King.

● O. H. GOLBERG has been named Western sales manager by the Eureka Vacuum Cleaner Co. Since Pearl Harbor, he has been director of the company's industrial relations and personnel work.

Cole Electric Co.

1510 South Los Angeles Street
PRospect 2068
LOS ANGELES 15, CALIFORNIA

●

POWER PLANT EQUIPMENT

AIR BREAK SWITCHES MANUALLY OPERATED
AIR BREAK SWITCHES MOTOR OPERATED
DISCONNECTING SWITCHES
BUS AND CABLE FITTINGS
BUS AND CABLE SUPPORTS
FUSE MOUNTINGS
FUSES
SWITCHBOARDS
INDUCTION RELAYS

MARINE EQUIPMENT

SWITCHBOARDS
ELECTRICAL EQUIPMENT RELAYS

AIRPLANE EQUIPMENT

BOMB RACKS
SWITCH HOUSINGS
THROTTLE SWITCHES
LIMIT SWITCHES
OIL FILLED SWITCH HOUSINGS
SWITCHBOARDS
RELAYS

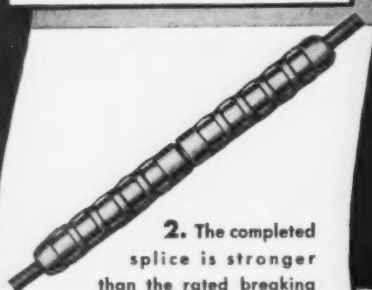
●

Pacific Coast Representatives

EICHER & BRATT
Colman Bldg., Seattle 4, Washington • • Eliot 2722
EARL S. CONDON COMPANY
357 S. Hill St., Los Angeles 13, Calif. • • MI. 2831

YES! THERE'S A SPECIAL
Nicopress
SPLICING SLEEVE
★
for "80" and "130" High Tensile Steel Power Conductors

1. Whether the joint is to be made in the air or on the ground, the job can be done faster and easier with Nicopress galvanized steel splicing sleeves.



2. The completed splice is stronger than the rated breaking strength of the wire itself.

The National Telephone Supply Company
5100 SUPERIOR AVENUE
CLEVELAND 3, OHIO
Canadian Mfr.—N. SLATER CO., LTD., HAMILTON, ONT., CANADA
Export Distributor
INTERNATIONAL STANDARD ELECTRIC CORP., NEW YORK, N. Y.

Merchandising Managers Appointed by Graybar

Graybar Electric Co. has appointed new merchandising managers at Portland and Spokane. Norman A. Hayes will take over the position in Portland and L. V. Schroder in Spokane.

Hayes, for the past 12 years has been merchandising manager for Stubbs Electric in Portland and previously was sales manager for Northwest Radio Supply Co. there.

Schroder joined the Graybar organization in 1939 and was in the Spokane territory as appliance salesman until 1942, when he took leave to work for the OPA.

● W. F. BOYLE, assistant to the vice-president of the Baldwin Locomotive Works, parent company of the Pelton Water Wheel Co., is now acting as the management's representative in San Francisco. C. G. CRAWFORD is acting as general manager of Pelton, with the additional duties of supervision of all industrial sales and service for the Pacific Coast district of Baldwin. C. D. ALLEN is responsible for all railroad sales and service on the Pacific Coast.

● ALBERT R. TUCKER has been appointed to the newly created position of West Coast manager of the electrochemicals department of E. I. du Pont de Nemours & Co. The El Monte, Calif., plant and sales office will be consolidated under Tucker, who comes from Philadelphia. Headquarters will be at El Monte and resident salesmen will be established at Seattle, San Francisco and Los Angeles.

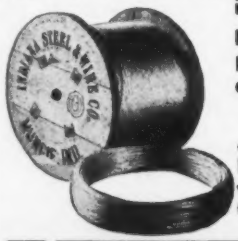
● W. H. ROBINSON, JR., formerly with G-E Lamp Department on the Pacific Coast, has been named manager of the department's advertising division. When he was transferred to Nela Park in 1942, Robinson was assistant manager of the department's South Pacific sales district.

● DR. LOUIS ELEGEL, specialist in heat transmission at Purdue University, has been engaged by Oregon State College to make a study of electric house heating. The study is being financed in part by the Bonneville Power Administration.

● JAMES L. RAY has been appointed head of the Joshua Hendy gas and steam-turbine engineering department in San Francisco.

● BERT CAYGILL has been appointed Lear representative in the eleven Western states and Hawaii. He will have his headquarters at 409 E. Second St., Los Angeles.

ALL the strength and durability inherent in steel are combined—with definite economies—in *Crapo* Galvanized Steel Strand. Heavy, ductile, tightly-bonded zinc coatings, applied by the famous *Crapo* Galvanizing Process, provide lasting protection against corrosion.



Ask the distributor of *Crapo* Galvanized Products near you or write direct for further information!

INDIANA STEEL & WIRE CO.
MUNCIE, INDIANA

H. H. Van Luven
307 East 3rd St. Los Angeles (13)
MUtual 5173
Manufacturers' Representative

CANNON ELECTRIC—DEVELOPMENT CO.
Hospital Signal Systems
Motor Plugs—Receptacles
Cable-Wire Terminals

LENZ ELECTRIC MFG. CO.
Lead—Braid Covered Cables and Wires
Tinsel and Copper Cordage
Special Cables

SIGNAL ENGINEERING & MFG. CO.
Relays—Bells—Horns—Code Call Systems
Fire Alarm Systems

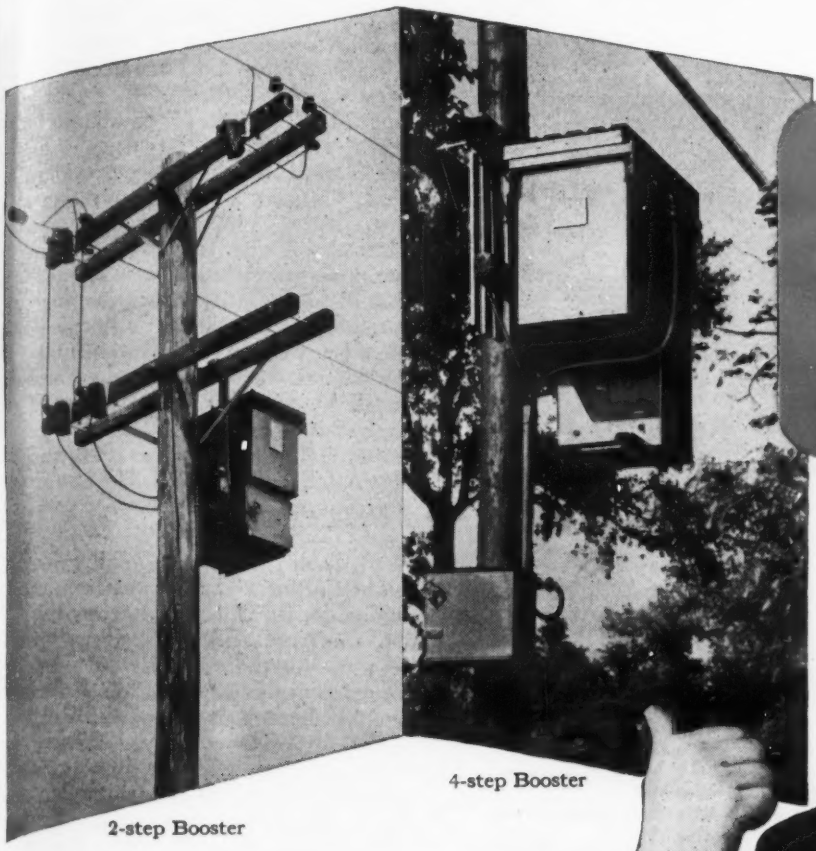
HART MANUFACTURING COMPANY
Remote Control Equipment—Relays—Thermostats

STERLING SIREN CO.
Electric Sirens

OPERADIO MANUFACTURING CO.
Flexifone Intercommunication Equipment

TRICO FUSE MFG. CO.
Fuses, Oilers, Clip Locks and Fuse Pullers

KNOX PORCELAIN CORP.
Electrical Porcelain.



2-step Booster

4-step Booster

WHICH WILL SOLVE YOUR VOLTAGE PROBLEMS?

Consult your

WESTINGHOUSE DISTRIBUTOR

FOR THE ANSWER TO DISTRIBUTION APPARATUS PROBLEMS

Voltage regulation is almost a "must" on rural lines or long extensions, to maintain good will and satisfactory operation of appliances.

Your Westinghouse Distributor offers a close-at-hand source of help on almost any problem involving feeder voltage regulation. He can give you on-the-spot help in selecting and applying the correct type of unit to meet any requirements you may have. He can supply you with the desired rating of inexpensive two-step and four-step booster regulators chosen to best meet the needs of your circuit.

Feeder voltage booster regulators are only a few of hundreds of distribution apparatus items which your Westinghouse Distributor has on hand to help you solve problems that require quick action. Other items range from porcelain insulators to automatic reclosing circuit breakers. Call on him for help—he's as handy as your telephone!

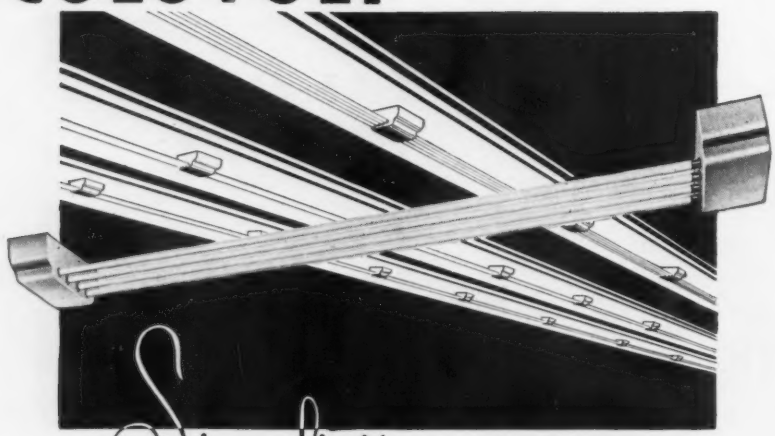
J-10281

YOUR WESTINGHOUSE DISTRIBUTOR can give you up-to-date specifications, prices and application data on a complete range of distribution apparatus. Ask him to put you on his mailing list for this new literature. Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa.

Westinghouse

PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE

*COLOVOLT



Simplicity LIGHTING UNITS

Cold Cathode Low Voltage

Long continuous lines of light, possessing all the recognized advantages of Colovolt Cold Cathode Fluorescent illumination, come to you in these "Simplicity" assemblies. Distinctive in design—easy to install—simple to maintain—no gingerbread attachments—no dust collecting areas—"Simplicity" units give balanced illumination with comfortable, easy-to-look-at light for every commercial installation. Units available to make individual 8 foot fixtures or continuous line lighting in multiples of 8 feet. Colovolt 93" 10,000 hour lamps (1) are guaranteed for 1 full year except for failure due to breakage, (2) require no starters—do not flicker, (3) are practically free of intermediate burn outs.

Contact your electrical wholesaler or jobber, or write us for full details and prices.

* Trade mark registered U. S. Pat. Off.

General LUMINESCENT CORPORATION

GENERAL LUMINESCENT CORPORATION

670 So. Federal St. CHICAGO 5, ILL.

Use More DROP FORGED Pole Line Hardware And Obtain ★

1 Plus Strength in Lighter Sectional Thicknesses.

2 Uniform Physical Structure, Size and Shape.

3 Freedom from Concealed Defects.

4 Extra Margin of Safety.

Forgings offer many direct and indirect economies. Consult makers of drop forged pole line hardware.

DROP FORGING ASSOCIATION

605 HANNA BUILDING • CLEVELAND, OHIO

● BURRELL S. MANUEL of Los Angeles, vice-president of Westinghouse Electric Supply Co., has received the Westinghouse Order of Merit for distinguished service. Presentation was made last month in Los Angeles by B. W. Clark, Pittsburgh, vice-president in charge of sales for the corporation and president of the supply company. Manuel was cited for "achievement in organizing and building a highly successful distributing business for the company in southern California; for his fine spirit of cooperation and for the human understanding he employs in all his dealings." He joined Westinghouse at Denver in 1905 and has been on the coast since 1920 and in Los Angeles since 1927. He was made a vice-president in September 1943.

● R. R. ROWELL, with Utah Power & Light Co. for 23 years, has been made Ogden division manager succeeding the late George L. Ellerbeck. Rowell went to work for the company as a hydro-electric generating station operator and has been manager of the Preston, Idaho, division since May 1937. He has served also as traveling maintenance engineer, division superintendent at Rexburg, Idaho, commercial superintendent of the Western Colorado Power Co., a subsidiary, at Delta, Colo. He was in the Army during World War I and following that received his engineering degree from Purdue University.

● JOSEPH E. CUSHMAN, Utah Power & Light Co. division manager at Rexburg, Idaho, will be transferred to Preston, Idaho, as division manager to succeed R. R. Rowell. He has been with the company since 1912 and has served on various parts of the system as salesman, troubleman, lineman, division superintendent and lines and service superintendent. He has been at Rexburg since May 1941.

● R. I. WOOLEY, manager of Utah Power & Light Co.'s branch at Evanston, Wyo., has been named head of the company's division at Rexburg, Idaho. He succeeds J. E. Cushman.

● WALLACE GEORGE, with Square D Co. for the past 18 years, will now handle the Allen Bradley account formerly handled by Garland Affolter in the northern California area.

● J. E. WINCHESTER, for five years at Alhambra, Calif., as National Telephone Supply Co. representative on the West Coast, has been named Western district manager of the company.

● GEORGE E. NEWLIN has been made Los Angeles district manager for Proctor Electric Co.

● NOEL PIKE has been made chief electrical engineer for the Imperial Irrigation District to replace E. H. Aiken, who has resigned to go with General Electric Co. in Los Angeles. Aiken had been with the district since May 1937. Pike is a native of California and a graduate of the California Institute of Technology at Pasadena. He has been in Mexico since 1930 and was associated with Central Mexico Inter-Connected System, a subsidiary of American & Foreign Power Co., at Guanajuato and Mexico City. He was superintendent of power, then general superintendent for Central Mexico and, when he resigned in 1944, was in charge of construction of all the syndicate's properties, including the Panama zone.

● JOHN A. CLAY, pioneer Colorado utility executive, retired from active service June 1. He started work in 1905 for the Western Colorado Power Co. for which he became vice-president and general manager, and in 1937, when it was consolidated with the Utah Power & Light Co., made his headquarters in Salt Lake City. Being a graduate of the University of California, he plans to return to that state, spending his summers in Colorado.

● APPOINTMENT OF WILLIS I. DOWNIE as Seattle plant manager for Trumbull Electric Mfg. Co. was announced in August by C. D. Hepler, president of the Pacific Coast division. Downie has been with Trumbull since 1923 and has had experience in the manufacturing and sales fields. He is a graduate of the University of Washington.

● LT. COMDR. W. D. HOWELL, former Pacific Gas and Electric sales engineer, has been made Bureau of Aeronautics representative at Lockheed, replacing Comdr. C. D. Palmer, retired. Howell has been with the Navy Lockheed office since it was opened.

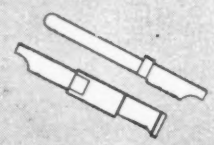
● EDWARD C. CAHILL has resigned as manager of utilities for San Francisco, a post which he had held since 1932. Among important developments completed under his direction are the Hetch Hetchy system, the municipal airport and the Market St. Railway purchase.

● LEE R. JONES has assumed his duties as district manager in Arapahoe County of the Colorado Central Power Co. at Englewood, Colo. He previously was district manager at Fort Lupton, where VINCEL E. SCRIVNER has been named to succeed him.

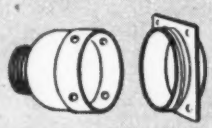
● CLARE G. SNIDER, editor of *Electro-Dealer*, of Utah Power & Light Co., resigned recently to enter sales of building materials in the Utah area.

Cannon manufactures the largest line of electric plugs and receptacles in the industry. Most connector needs can be met by some standard Cannon Connector. Four major factors govern the selection of the right one:

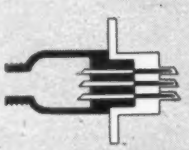
INSERTS *must be large enough to provide required contact diameters and spacing to meet specified voltage and amperage loads.*



CONTACTS *size, construction and materials are governed by the type of circuit—high frequency, heavy duty, low level or thermocouple.*



SHELLS *vary in shape, (round, square, oval or angular) to meet weather, mechanical and safety requirements of the application.*



COUPLING METHODS *depend on vibration frequency of use, and the force needed to couple or disconnect, critical in some locations.*

Write for this new bulletin "Helps in Selecting an an Electric Connector," just printed. Address Dept. A-207, Cannon Electric Development Company, 3209 Humboldt Street, Los Angeles 31, California.

CANNON ELECTRIC

Cannon Electric Development Co.
Los Angeles 31, California

Canadian Factory and Engineering Office:
Cannon Electric Co., Ltd., Toronto, Canada

REPRESENTATIVES IN PRINCIPAL CITIES—CONSULT YOUR LOCAL TELEPHONE BOOK

NEW LOW PRICES See Your JOBBER

IDEAL "WIRE-NUTS"
Solderless, Tapeless Wire Connectors

The new low prices still further reduce the cost of making wire joints in wiring of factories, buildings, homes, etc.

Leading electrical contractors are using millions of IDEAL "Wire-Nuts" because they're better electrically — stronger mechanically. Easy to apply — strip wires, screw on — that's all! Approved by Underwriters' Laboratories, Inc.

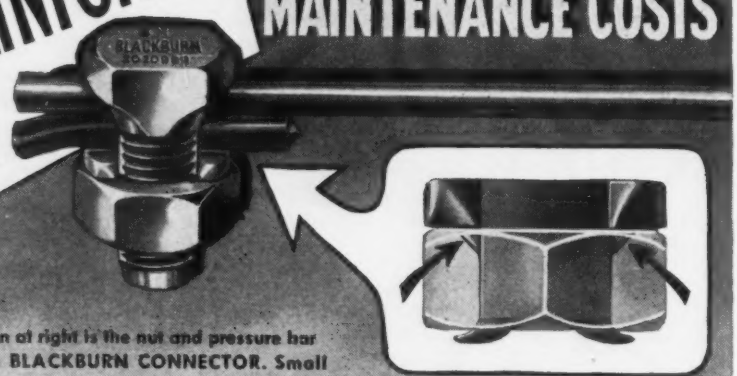
PROMPT DELIVERY

Electrical Products Division
IDEAL COMMUTATOR DRESSER CO.
Sales Offices in All Principal Cities

IDEAL Sycamore

WEST COAST WAREHOUSE STOCKS:
Stricby & Barton, Ltd., 912½ E. Third St., Los Angeles, Cal. F. M. Nicholas Co., 1123 Harrison St., San Francisco, Cal. L. S. Foley, 131 S.W. 4th Ave., Portland, Oregon. Northwestern Agencies, 2411 First Ave., Seattle, Wash.

REINFORCED -to REDUCE your MAINTENANCE COSTS



Shown at right is the nut and pressure bar of a BLACKBURN CONNECTOR. Small arrows indicate how this bar is reinforced on both sides. Like the tie rods on a bridge, these two reinforcements greatly strengthen the pressure bar, giving it maximum rigidity and enabling it to distribute the pressure over the entire length of the connection. Thus, the BLACKBURN reinforcing makes a strong connector still stronger, and reduces your maintenance costs!

Over 100 Conveniently-located Jobbers' Stocks

BLACKBURN Hi-Strength CONNECTORS

JASPER BLACKBURN PRODUCTS CORP.
Main and Clinton Sts. ST. LOUIS 6, MO.

Deaths

● ERNEST P. SMITH, 60, retired Fresno manager, Pacific Gas and Electric Co., died Aug. 5 in that city. He had been with the company and its predecessors for 37 years before his retirement in March 1944. Mr. Smith was a native Californian and started to work for San Joaquin Light & Power Corp. in 1911 under the late A. G. Wishon. He became head bookkeeper, then chief clerk and still later assistant to the general manager. Following merger of the San Joaquin Power and Great Western Power organizations in 1926, he was made assistant to A. Emory Wishon, then vice-president and general manager. When Wishon became president of San Joaquin Power in 1929, Mr. Smith continued as his assistant. With merger of San Joaquin Power with Pacific Gas and Electric in 1939, Wishon became vice-president and, as his assistant, Mr. Smith was directly responsible for the operation of the San Joaquin Power division. He was named division manager in 1943 when Wishon became general manager of PG and E.

● EDWARD J. WALLIS, 71, for 37 years associated with Graybar and its parent, Western Electric Co., died Aug. 16 in San Francisco. Mr. Wallis was Pacific Coast manager from 1916 until 1933. He joined Western Electric in New York in 1896, following his graduation from the University of Rochester. Two years later he was made chief clerk in Chicago and in 1902 was transferred back to New York. In 1906 he became traveling clerical inspector of branch houses and in that capacity visited San Francisco shortly after the earthquake and fire. Ten years later he returned as Pacific district manager.

● GEORGE L. ELLERBECK, 41, Ogden division manager of the Utah Power & Light Co., was killed in an automobile accident July 31 near Ogden. A civil engineering graduate of the University of Utah, Mr. Ellerbeck joined U.P. & L. in 1926 and served in the Salt Lake division sales department, the commercial lighting department and as industrial sales superintendent. In 1936 he was appointed Provo division manager, transferring to Ogden in 1940.

● WALTER S. DOLE, 77, consulting engineer for Federal Light & Traction Co. in New York until his retirement in 1933, died Aug. 15 in Los Angeles, Calif. A civil engineer, Mr. Dole has participated in construction of electric, gas and water facilities throughout the United States, Canada and Hawaii.

FROM DOME REFLECTORS TO FLUORESCENTS

You can depend upon highest quality efficiency and durability when you

SPECIFY BENJAMIN PORCELAIN ENAMEL LIGHTING UNITS

Low cost, high efficiency and "built-like-a-battleship" durability make Benjamin Turn-Lox RLM Dome Reflectors the logical choice for tens of thousands of industrial locations. Like all Benjamin units, they are built to deliver maximum lighting efficiency at *lowest per year* operating and investment cost.

In specifying Dome Reflectors, remember that only in Benjamin units do you get all three: *the RLM Label*, for certification of correct design, high efficiency and uniform quality; BENJAMIN TURN-LOX for time-saving cleaning and relamping operations; BENJAMIN LIFE-TIME PORCELAIN ENAMEL . . . . specially developed for battleship durability, quicker, easier cleaning, and maintenance of original lighting efficiency through the years. For Free Bulletin, write Benjamin Electric Mfg. Co., Dept. J, Des Plaines, Ill.

BENJAMIN TRADE MARK
Lighting Equipment
DISTRIBUTED EXCLUSIVELY THROUGH ELECTRICAL WHOLESALERS

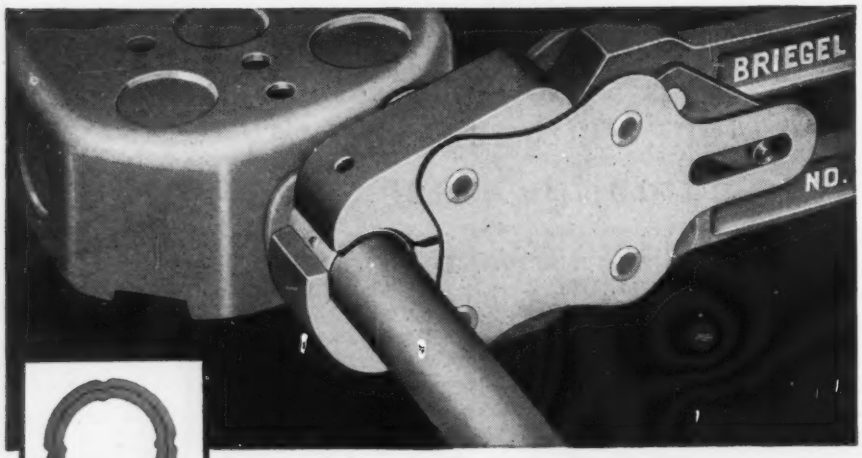
1 Benjamin Life-Time Porcelain Enamel reflecting surfaces meet RLM specifications of one ground and two coats of separately fired white porcelain enamel and in addition, have durability advantages resulting from years of Benjamin pioneering in porcelain enamel development.

2 Corrosion Resisting Reflector Bead Construction . . . example of Benjamin "built-like-a-battleship" construction; porcelain enamel seal protects against moisture penetration and corrosion.

3 Shielding Angle of 72½ degrees (RLM specification) minimizes direct glare.

4 Highest Light Reflecting Efficiency consistent with proper light diffusion; meets highest RLM specifications for light output of 78% or more of light generated by bare lamp.

5 Turn-Lox...rugged, foolproof, bayonet type coupling which permits detachment of reflector and lamp as one unit. Contacts are self-cleaning when reflector is turned one quarter turn for removal and replacement.



Cross section Showing Indentations.

E·M·T·UP THE QUICK WAY
Two Squeezes and it's Set

TWO QUICK SQUEEZES give you Finer, Faster Conduit Connections. B-M Fittings do away with the twisting, turning and tightening of nuts and save you valuable time and materials. Then too, they are stronger, neater and much easier to work with in tight places. Start using B-M Fittings today. Have more satisfied customers—more profits from each job!
(All B-M Fittings carry the Underwriters Seal of Approval)

DISTRIBUTED BY
The M. B. Austin Co., Chicago, Ill.
Clayton Mark & Co., Evanston, Ill.
Clifton Conduit Co., Jersey Cy., N. J.
Gen. Electric Co., Bridgeport, Conn.
The Steelduct Co., Youngstown, Ohio
Enameled Metals, Pittsburgh, Penn.
National Enameling & Mfg. Co., Pittsburgh, Pa.
Triangle Conduit & Cable Co., New Brunswick, N. J.

Prompt Deliveries on Properly Rated Orders

BM BRIEGEL METHOD TOOL CO. • Galva, Ill.

HELWIG COMPANY

•

Carbon Products

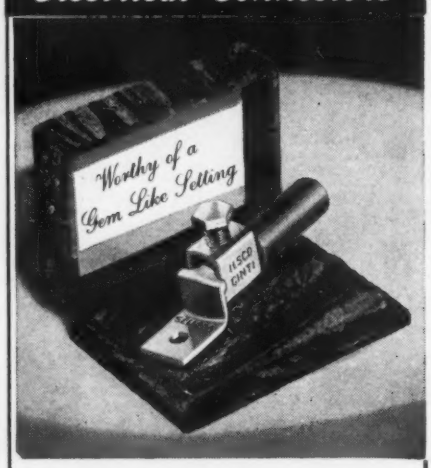
•

Multiflex Brushes
Give Better
Commutation,
Longer Life,
Less Commutator Wear,
That Extra Demand Required,
Better Performance
All Around

Pacific Coast Offices
116 New Montgomery St.,
San Francisco 5, Calif., Garfield 3274
166 Jackson Street
Seattle, Washington Elliott 7133
711 N. W. Everett Street
Portland, Oregon Beacon 3368
225 W. Pico Boulevard
Los Angeles, Calif. Prospect 2523

KEEP THE BONDS YOU BUY

ILSCO
Electrical Connectors



No, we don't ship ILSCO CONNECTORS in fancy jewel cases. Nor do we make them from castings which are heavy, costly and of poor conductivity when compared to the pure 99.99% electrolytic copper of 100% conductivity used in all ILSCO CONNECTORS.

Remember—it isn't weight that counts . . . it's conductivity!

Write for 48-page illustrated catalog.

Western Distributors
ELECTRICAL SPECIALTY CO.
Seattle—San Francisco
STRIEBY & BARTON, LTD.
Los Angeles

ILSCO COPPER TUBE & PRODUCTS, Inc.
CINCINNATI, OHIO

TRADE notes

Meyberg Co. Drops Supply Business with War's End

L. J. Meyberg Co., anticipating the return of radio and appliances, has disposed of its supply business in order to set its pace to the fast-moving merchandising situation of the future. With several top-rank national lines, among them RCA-Victor, Norge and Bendix, Al Myer, president, says that the responsibility of giving these the full promotion they deserve makes it seem desirable to drop off the slower moving supply business and concentrate once more on merchandise lines.

Meyberg's entry into supply business came as an outgrowth of its expanding supply of radio equipment to the armed forces as representatives of RCA. The supply lines also enabled the company to retain its personnel by transferring their erstwhile merchandising activities to supply sales. To prepare them for a totally new type of work, the company made history by sending the force to trade school to learn electrical equipment. Until merchandise returned the Meyberg organization helped supply military and war production needs for distribution of supply line products.

In San Francisco, most of the supply lines carried by Meyberg were sold to the California Electric Supply Co. In southern California, Gryde Electric Co. has taken these lines to set up a new wholesale distributorship.

● Allan R. Royle, sales manager of Stromberg-Carlson's sound equipment division, recently made a three-week tour of the Pacific Coast, visiting the company's distributors, including Industrial Electronics Inc., Portland, Pacific Wholesale Co., San Francisco, and Gough Industries Inc., Los Angeles. He was accompanied by T. C. Thompson, West Coast division manager, and Bond Barney, sound equipment division representative. Speaking before 275 members of Gough Industries, Royle predicted an extensive market for sound equipment in the post-war growth of the Pacific Coast.

● Andrews Electric Co. at Modesto has been taken over by the two sons of Frank Andrews, its founder. Don Andrews now operates the business. The other son, in the Navy, will join the business upon his discharge. Frank Andrews is set up as a consulting electrical and mechanical engineer at 531 Eleventh St., Modesto.

● CONSUMER DURABLE GOODS represent the electrical manufacturer's greatest opportunity after reconversion, A. C. Streamer, Westinghouse vice-president and NEMA president, told the Colorado Society of Engineers at its recent mid-summer meeting in Denver. A forecast from recent surveys shows such sales 138% higher than in 1941 for the first full year of unrestricted production, he said. Reconversion problem, however, will be serious, he pointed out, since complete changes in manufacturing facilities were required for war products. For heavy electrical apparatus and general purpose and small motors there is little or no problem, he believes, since war demands, while frequently calling for different types than usual, still permitted the use of existing facilities in most cases.

● H. H. VAN LUVEN, Los Angeles, has been named southern California and Arizona representative for the commercial sound division of Operadio Mfg. Co. of St. Charles, Ill. Van Luven will act as sales representative and later will maintain inventories of Operadio equipment, including plant broadcasters, inter-office communication systems, loud speakers and amplifiers. The Los Angeles firm's engineering staff will assist distributors and sound men with technical problems and with installations and servicing, it is announced. The Van Luven company has headquarters at 307 E. Third St., Los Angeles.

● DON LEE has filed with the FCC for permission to install a 40-kw. television transmitter 5,800 ft. above sea level on Mt. Wilson outside Hollywood. The transmitter, one of the world's largest, will be built by General Electric. According to Harry R. Lubcke, Don Lee television director, the network's television station in operation at Los Angeles since December 1941, will be used as a relay station and studio site.

● FIRM of Davies Electric Co., contracting engineers, has been formed at San Diego, Calif., with offices at 327 West E St. William E. Davies is owner, Earl C. Myers, manager, of the new concern. Myers was with the old Southern Electric Co. and is one of the initial members of the San Diego Electric Club. For the past 14 years, he had been assistant manager of Gill Electric Co., in San Diego.

● ELECTRON EQUIPMENT CORP., South Pasadena, Calif., manufacturer of electronic industrial equipment, has enlarged its production facilities and announces that it plans nation-wide distribution postwar. New officers are: Harrison Matthews, president and general manager; William A. Godshall, vice-president; Howard Burrell, secretary; N. J. Redmon, treasurer.

● QUALITY ELECTRIC CO. Ltd. in an announcement signed by J. O. Case, president, announces affiliation with Aircomp Ltd. as a member of the Aircomp group of industries. Aircomp manufactures electronic and radio type equipment, now largely for the armed forces. Quality Electric does industrial electric construction and wiring, motor, generator repairing and rewinding, transformer repair and rewinding, electrical instrument repair, construction of specialized electric apparatus and design and installation of infrared drying systems. Also announced was an Infrared Clinic to be held at the Fostoria Laboratory, Room 503, Bendix Building, 1206 Maple Ave., Los Angeles, July 18 to 20.

● A SYNTHETIC LATEX production unit will be installed at the Los Angeles synthetic rubber plant operated by the United States Rubber Co., F. S. Carpenter, manager has announced.

● R. B. LANE and HOWARD BAILEY have purchased the Industrial Electric Co., Seattle, from Louie Benedetti.

The Products and Services of these Well-Known Manufacturers are available to Western Industry through Marwood
SHERMAN Electrical Fittings
PERMANENTLY INSULATED
ROCKBESTOS
WIRES AND CABLES
GRIPBELT AND F.H.P
BROWNING
DRIVES
The United States Graphite Company
CONTINENTAL DIAMOND FIBRE COMPANY
Asheville MICA Products
ARMATURE COIL EQUIPMENT, INC.
MARWOOD LIMITED
SEATTLE • PORTLAND • SAN FRANCISCO • LOS ANGELES

INDEX TO ADVERTISERS
September, 1945

Allis-Chalmers Mfg. Co. 4, 5, 12
Aluminum Co. of America 69
Anaconda Wire & Cable Co. 25

Bendix Home Appliances Inc. 39
Benjamin Elec. Mfg. Co. 145
Bethlehem Steel Co. 65
Blackburn Corp., Jasper 144
Briegel Method Tool Co. 146
Bull Dog Electric Prod. Co. 63
Burndy Eng'g. Co. Inc. 57

Cannon Elec'l. Dev. Co. 143
Certified Ballasts Mfgrs. 46
Chance Company, A. B. 136
Cole Electric Co. 139
Collyer Ins. Wire Co. 51
Copperweld Steel Co. 32
Crescent Ins. Wire & Cable Co. 62
Crocker 1st Nat'l. Bank 130
Crouse Hinds Company 23
Curtis Lighting, Inc. 71

Driver-Harris Co. 138
Drop Forging Association 142

Electromaster, Inc. 48

Faries Mfg. Co. 66
Federal Electric Products Co. 120
Fleur-O-Lier Mfgrs. 58, 59
Four Wheel Drive Auto Co. 30
Frigidaire Division, General Motors Corp. .. 36

General Cable Corp. 54
General Electric Co.:
Bridgeport 15, 33, 41, 45 129
Cleveland 26, 27
Schenectady 1, 20, 64
General Luminescent Corp. 142
General Mills 3
Guth Company, Edwin F. 68

Helwig Company 146
Hendy Iron Works, Joshua 19
Holophane Co. Inc. 40
Honn Company, George E. 136

Ideal Commutator Dresser Co. 144
Ilsco Copper Tube & Prod. Inc. 146
Indiana Steel & Wire 140
Irvington Varnish & Ins. Co. 67

Jeffries Transformer Co. 130

Kearney Corp., James R. 8
Klein & Sons, Mathias 135
Kyle Corp. 29

Landers, Frary & Clark 47
Leader Electric Co. 9
Lloyd Products Co. 56

Malleable Iron Range Co. 42
Marwood, Ltd. 147
Matthews Corp., W. N. 126
McGill Mfg. Co. 126
Mica Insulator Co. 131
Miller Co., The 123
Mitchell Mfg. Co. 21

Nash-Kelvinator Corp. 6, 7
National Electric Products Corp. 133
National Tele Supply Co. 140

Okonite Company 11
O. Z. Elec'l. Mfg. Co. 136

Pacific Coast Electrical Assn. ..... 4th Cover
Pacific Gas and Electric Co. ..... 3rd Cover
Paragon Electric Co. 44
Pelton Water Wheel Co. 61
Penn-Union Electric Corp. 70
Proctor Electric Co. 38
Punch-Lok Company 132

Railley Corp., The 127
Railway & Industrial Eng'g. Co. 55
Reliable Electric Co. 121

Samson United Corp. 43
Shell Oil Company 24
Sherman Co., H. B. 130
Simplex Wire & Cable Co. 117
Smoot-Holman Co. 124
Southern Calif. Edison Co. Ltd. ... 2nd Cover
Spang-Chalfant Div., Nat'l Supply Co. .. 18
Square D Company 13
Standard Oil Company 14

Thomas & Betts Co. Inc. 128
Tork Clock Co., Inc. 132
Trico Fuse Mfg. Co. 138
Trumbull Electric Mfg. Co. 137
Tuttle & Kift 50

Union Oil Company 37
U. S. Rubber Company 49, 73
Universal Tool Co. 132

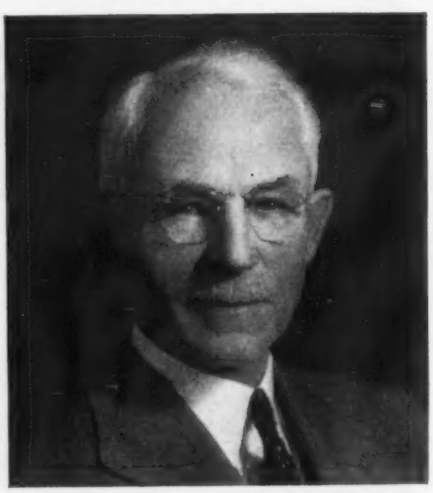
Van Luven Co., H. H. 140
Victor Insulators, Inc. 134

Wagner Electric Company 22
Wakefield Brass Co., The F. W. 119
Ward Leonard Elec. Co. 134
Westinghouse Electric Corp.:
Bloomfield 52, 53
Mansfield 35
Pittsburgh ... 10, 16, 17, 31, 60, 74, 125, 141
Wiegand Co., Edwin L. 34
Youngstown Sheet & Tube Co. 28

PROFILES *of the month*

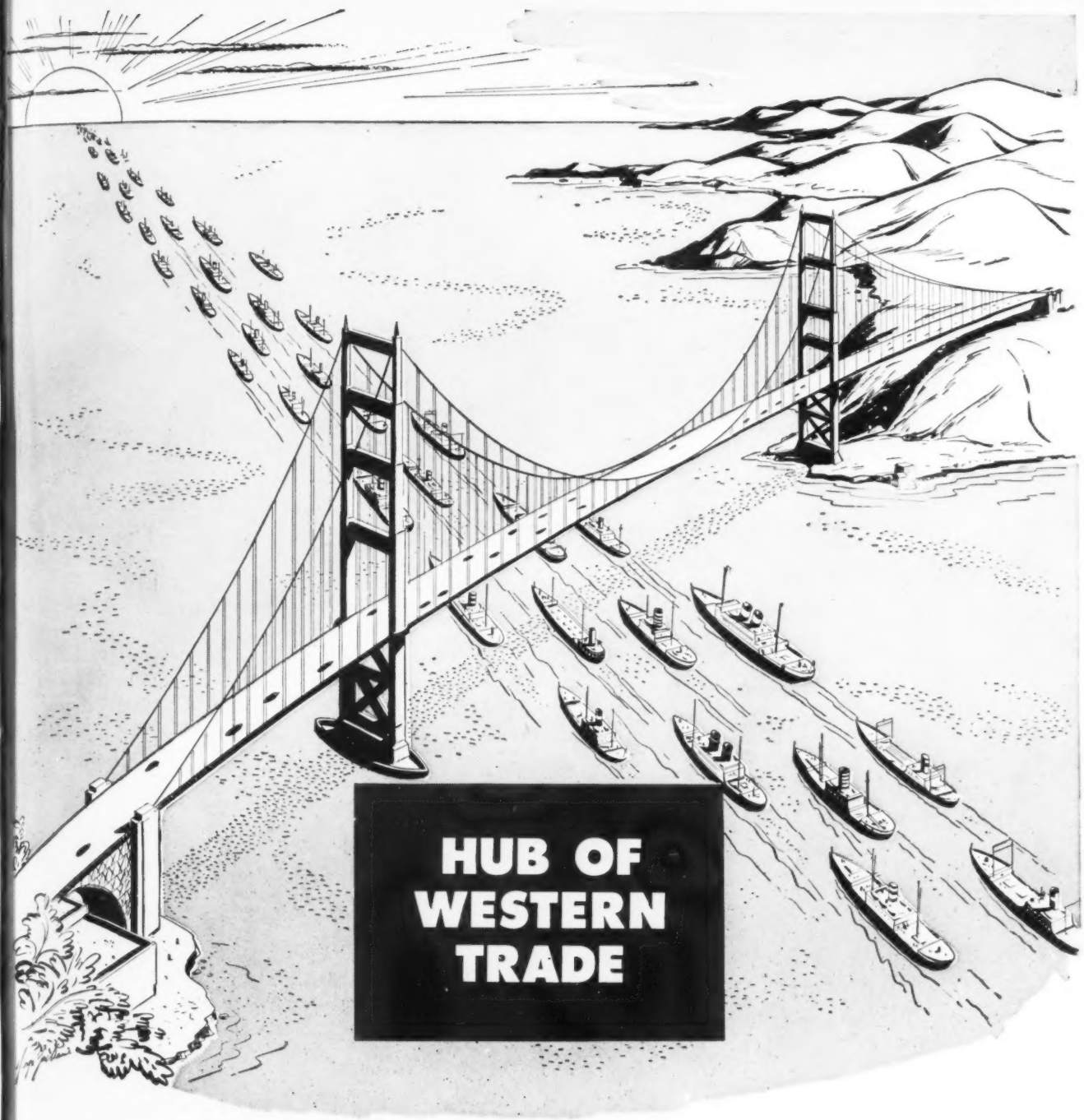
George R. Sommers has been transferred to San Francisco by Sylvania as Pacific Coast sales manager, lighting division. Succeeds Bart Wickstrum, now Chicago manager. Sommers had been Washington, D.C. manager since 1943

R. R. Rowell, newly appointed Ogden division manager for Utah Power & Light Co., has been with company for 23 years. Was manager of Preston, Idaho, division, when he was moved to Ogden to succed late G. L. Ellerbeck



C. P. Staal, comptroller of the Southern California Edison Co., retired from active service with the company on Aug. 1 after 41 years in the California electrical industry. He joined the San Joaquin Light & Power Corp. in November 1905, going to Pacific Light & Power Corp. in 1914. He was auditor for P. L. & P. when the company merged with Southern California Edison in 1917, and remained as auditor for Edison. Thirteen years later he became general auditor, and was appointed comptroller in 1939. For many years a national leader in utility accounting field, Staal was active in establishment ment of utility classification of accounts

Taken on anniversary of Pacific Power & Light Co.'s thirty-fifth year in Yakima, picture below shows Louis Happy, early-day construction foreman, with 47 years in electrical industry, receiving service pin from George Bragg, company vice-president and general manager. Others shown are, from left: R. E. Fewel, Naches plant, 45 years service; L. W. Dick, Yakima manager, 32 years; William Whitlow, Yakima, 43 years; Harvey G. Humphrey, Yakima line superintendent, 36 years



From the PORT OF SAN FRANCISCO [*CARGOES ACROSS THE PACIFIC TRAIN LOADS TO COASTAL STATES*

Electricity turns from its vital war job, where it established a record of unfailing accomplishment, to the mighty tasks of peacetime industrial California.

First, there is the work electric power will perform in agriculture, in heavy industry, in manufactures, in every step of production and commerce down to the last moment loading of shipments. *Electric power will be available for every one of these jobs and the new industries to be established here.*

Next, there is the work of electrical appliances and equipment in the varied processes of manufacture.

And finally, there is the vast market that will be offered by the lands of the Pacific to the manufacture of electrical goods and machinery.

Pacific Gas and Electric Company is cooperating fully with the electrical industry in its planning to meet the demands of the postwar world.

EW—43X—945

P·G·and E· PACIFIC GAS AND ELECTRIC COMPANY

OBJECTIVE
Improved Industrial Lighting

Remove the shadows of obsolescence from plant and shop illumination

THE industrial lighting field is rich in potentials.

In the rush and drive for maximum war production, re-design of lighting systems has lagged or been deferred in many plants because of material shortages.

The science of lighting, meanwhile, has been forging ahead, devising new products and more effective techniques. Whether for fluorescent, mercury or incandescent installation, there are prospects awaiting the lighting engineer on every hand.

Growing recognition of the close relation of functional lighting to plant efficiency spells *Opportunity* for manufacturer, jobber, dealer, contractor and the power producer.

Industrial lighting can be planned and installed *today* for essential projects; it can be blue-printed now for tomorrow's conversion of industry to peacetime production.

PACIFIC COAST ELECTRICAL ASSOCIATION

447 SUTTER STREET, SAN FRANCISCO, 8 • 601 WEST FIFTH STREET, LOS ANGELES 13